

ADDICTA

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ORIGINAL ARTICLE

Sociodemographic and Clinical Characteristics of Vaccine Hesitancy at an Outpatient Addiction Treatment Center

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Main Points

- People with addiction have lower vaccination rates than the general public.
- Type of substance can be identified as a risk factor for vaccine hesitancy.
- Higher education and older age were significant variables favoring higher vaccination rates.

Abstract

After the first cases of coronavirus disease 2019, more than 700 million people were infected with severe acute respiratory syndrome coronavirus 2, and more than 7 million people died. The development of new vaccines helped alleviate the pandemic's effects. People with addiction have lower vaccination rates compared to the general public. Reasons like vaccine hesitancy, difficulty in accessing healthcare services, and stigmatization all contribute to this issue. We aimed to investigate the sociodemographic characteristics that might have an impact on vaccination in people with addiction. Accordingly, 394 participants were included in the study. Structured Clinical Interview for DSM-5 (SCID-5) -5 was employed to make the psychiatric diagnoses of the participants. Case report forms were filled out for the participants' sociodemographic characteristics and psychiatric and family history. Participants were compared regarding their vaccination status. There were significant relationships between vaccination rates and sociodemographic characteristics of the participants. Older and more educated participants were more likely to get vaccinated. There was a significant relationship between substance type and vaccination rates. Vaccination rates were lower for participants compared to the general population. The results indicate that specific sociodemographic and clinical characteristics can be identified as risk factors for vaccine hesitancy in people with addiction. Prioritizing this group will help reduce vaccine hesitancy and increase vaccination rates.

Keywords: Addiction, demographics, education, substance use, vaccination

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Introduction

It has been almost four years since the first cases of coronavirus disease 2019 (COVID-19). During this time, more than 700 million people were infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and nearly 7 million people died (Dadax, 2020). Fortunately, the numbers started to slow down with the development of different vaccines and worldwide vaccination procedures. Unsurprisingly, vaccination and the concept of

vaccines became a trendy subject in public. It has been shown that the success of vaccination depends not only on the vaccine itself but also on the public (Jacobson et al., 2015).

Thoughts and beliefs on vaccination differ vastly among different sociocultural groups. In a recent study in the USA, vaccine hesitancy was found to be higher in African-American people and people with lower income status (Yasmin et al., 2021). Data show that people with addiction problems are less

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likely to trust the vaccination compared to the general population (Masson et al., 2021). Also, people with addiction have lower vaccination rates for other recommended vaccinations such as diphtheria, hepatitis A, hepatitis B, influenza, etc. (Frew et al., 2021). The Australian National Drug Surveillance System stated that only 57% of the people who use IV drugs would receive a COVID-19 vaccine if available, while in the general population, this rate was 77% (Dietze et al., 2022). This would lead to lower vaccination rates in people with addiction. A recent study conducted in Barcelona showed that this vaccine hesitancy of people with substance use disorder (SUD) can be reversed with information and education provided by medical professionals (Vallecillo et al., 2022). As a public health measure, providing information and education to people with SUD would increase vaccination rates in this group. This would help people with SUD and the general population because, in a pandemic, all the population must be addressed to gain immunity. Today, the worldwide prevalence of SUDs is estimated to be around 100 million for alcohol use disorders and between 27 and 41 million for people who are opioid dependent (Dadax, 2020). Drug and alcohol use disorders are ranked 16th and 20th, respectively, as the leading causes of the global burden of disease in adults aged 25 – 49 years (Yasmin et al., 2021). These numbers indicate that addiction is an essential problem for the general population and should not be discarded.

People with addiction also have a higher risk for SARS-CoV-2 in terms of medical complications from the infection itself and comorbid medical conditions such as liver disease, cardiovascular disease, respiratory problems, and compromised immune systems (Pavarin et al., 2011). It has been shown that people with addiction are more likely to need mechanical ventilation and intensive care in the case of COVID-19 compared to the general population (Ramakrishnan et al., 2022). As a high-risk group, people with SUD should be prioritized for vaccination. Multiple reports indicate they have trouble gaining access to health services or receiving adequate health care because of social and economic inequalities and discrimination from healthcare providers (Melamed et al., 2020). Unsurprisingly, these challenges for disadvantaged groups become much more apparent in a global crisis like a pandemic.

According to the literature data, sociodemographic characteristics, such as age, marital status, educational status, and employment, also play an essential part in vaccine hesitancy. It may be beneficial to create sociodemographic segments to plan how to reach these groups to increase vaccination rates.

To date, the data about COVID-19 vaccinations in people with addiction problems are very limited. We aimed to investigate the difference in vaccination rates between people with addiction and the general population in Türkiye. Additionally, we analyzed the sociodemographic differences and differences in substance use in the substance user group to identify their possible effects on vaccination status.

While designing the study, we developed a couple of hypotheses we would like to test that align with the literature data, which will be discussed in the manuscript. Firstly, we hypothesized that older people would be more likely to get vaccinated than younger people. Another hypothesis was that people who used drugs would be less likely to get vaccinated compared to alcohol users.

Lastly, we assumed that people with addiction would have lower vaccination rates compared to the general population.

Material and Methods

This study was approved by the Ege University Clinical Research Ethics Board and complied with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, revised in 2008 (Approval number: 23-2T/25 Date: 09.02.2023). All participants gave written informed consent before the enrollment. Participants who were referred to the Ege University Psychiatry Clinic were included in the study after an evaluation of the inclusion and exclusion criteria.

Inclusion criteria were: (1) being older than 18, (2) diagnosis of addiction according to DSM-5, and (3) acceptance to participate after being informed about the study. Exclusion criteria were: (1) having a mental illness that would affect the reliability of answers to questionnaires, (2) mental retardation, (3) current or past diagnosis of COVID-19, (4) having a disease that would cause immunodeficiency, (5) having a contraindication for COVID-19 vaccination, and (6) having an oncological disease.

SCID-5 was employed to make the psychiatric diagnoses and identify the comorbidities of the participants. Case report forms were filled out for the participants' sociodemographic characteristics, psychiatric history, and family history. Sociodemographic data comprised age, gender, marital status, educational status, and employment status. Participants were compared regarding their vaccination status (getting the first dose of vaccination, getting the second dose of vaccination, and getting both doses of vaccination). These groups were compared with regard to the sociodemographic data and substance types. The vaccination rate of the whole sample was compared to the vaccination rate of the general population for the city of İzmir and Türkiye. The data for the vaccination rate of İzmir and Türkiye were collected from <https://covid19asi.saglik.gov.tr/>. The study was initiated after the onset of the administration of the second dose of vaccination for the entire population. Detailed data about the vaccination program in Türkiye for COVID-19 are accessible through this link: <https://covid19asi.saglik.gov.tr/TR-77706/covid-19-asisi-ulusal-uygulama-stratejisi.html>. The data collection lasted for 13 weeks until the desired sample size was reached, calculated with a-priori power analysis.

Statistical analyses were performed using the SPSS for PC version 25 (IBM SPSS Corp.; Armonk, NY, USA) software. The Shapiro – Wilk test was used to assess normal distribution. Numeric variables were expressed as mean and standard deviations if there was a normal distribution, whereas median with interquartile range (IQR) if there was a skewed distribution. Parametric comparative analyses for demographic and clinical characteristics of the groups were performed with an independent *t*-test. For non-parametric distributions, a Mann – Whitney *U*-test was performed. Where appropriate, categorical data were analyzed using the chi-square or Fisher's exact test. Dummy variables were used where there were more than two categories. The odds ratio was calculated where applicable. Age, gender, marital status, educational status, employment status, and substance types were used as the independent variables. Vaccination status was used as the

dependent variable. Logistic regression analyses were performed to determine the predictive values of significant variables. The level of significance was set at $p \leq .05$.

Results

Our sample consisted of 394 participants. The sex distribution was 90.2% male vs. 8.8% female. The mean age of the sample was 36.54 (minimum: 18; maximum: 74, SD: 12.363).

Of the participants, 283 (71.8%) received the first vaccination dose for COVID-19. Mean age (38.94 ± 12.64 vs. 30.37 ± 9.10 ; $p < .001$) and education duration (10.49 ± 3.01 years vs. 9.77 ± 2.61 years; $p = .007$) were significantly higher in the vaccinated group compared to the non-vaccinated group. Furthermore, 80.3% ($n = 183$) of the participants who had a marriage history received the first dose of vaccination compared to 60.7% ($n = 100$) of the participants who did not have a marriage history ($p < .001$). About 81.1% ($n = 142$) of the participants who had an occupation were vaccinated, whereas the vaccination percentage was 64.4% ($n = 141$) for the unemployed participants ($p < .001$).

For the second dose of vaccination, 195 (49.5%) participants were vaccinated. The statistical differences regarding age (41.72 ± 13.09 vs. 31.47 ± 9.10 ; $p < .001$) and education duration (10.86 ± 3.04 years vs. 9.72 ± 2.68 years, $p < .001$) were significant for the second dose of vaccination. Also, 60.5% ($n = 138$) of the participants who had a marriage history received the second dose of

vaccination, and this rate was 34.3% ($n = 57$) for the participants who did not have a marriage history ($p < .001$). The vaccination rate for the second dose was 59.4% ($n = 104$) for the participants who had occupations and 41.6% ($n = 91$) for the unemployed participants ($p < .001$).

Some participants got the first dose of vaccination but not the second one. Accordingly, 88 (31.1%) participants did not get the second vaccination after the first dose. Comparing this group with the participants who got both vaccination doses, the age and education duration differences were similarly significant. Participants with a marriage history were more likely to complete the vaccination process. Contrary to previous comparisons, there were no significant differences regarding employment status. Collected data are summarized in Table 1.

Table 2 compares the non-vaccinated participants with the participants who received two doses of vaccination.

We performed two logistic regressions. One determined the odds ratios of the variables for getting two doses of vaccination compared to non-vaccinated participants, and the second determined the odds ratios for the participants who got the first dose of vaccination but not the second one compared to vaccinated participants. The collected data are summarized in Tables 3 and 4.

Finally, we compared the vaccination rates of our sample to the vaccination rates of the general population in the city of Izmir,

Table 1.
Second Dose of Vaccination (within the participants who got the first dose)

	Vaccinated 68.9% ($n = 195$)	Not-vaccinated 31.1% ($n = 88$)	p^*		
Age [†]	41.72 [18 – 74]	32.86 [18 – 57]	<.001		
Education (years) [†]	10.86 [5 – 16]	9.66 [5 – 16]	.001		
	n (%)	n (%)	p^{**}	OR	95% CI
Gender					
Female	21 (75)	7 (25)	.463	1.397	[0.571 – 3.418]
Male	174 (68.2)	81 (31.8)			
Marriage history					
Yes	138 (75.4)	45 (24.6)	.001	2.313	[1.376 – 3.890]
No	57 (57)	43 (43)			
Employment					
Yes	104 (73.2)	38 (26.8)	.114	1.504	[0.906 – 2.497]
No	91 (64.5)	50 (35.5)			
Substance type					
Alcohol use disorder					
Yes	106 (78.5)	29 (21.5)	.001	2.423	[1.432 – 4.101]
No	89 (60.1)	59 (39.9)			
Drug use disorder					
No	128 (80)	32 (20)	<.001	3.343	[1.977 – 5.654]
Yes	67 (54.5)	56 (45.5)			

Note: [†]Mean value and minimum-maximum values are given. ^{*}Mann – Whitney U-test. The significance level is 0.05. ^{**}Pearson chi-square test. The significance level is 0.05. CI, confidence interval; OR, odds rate.

Table 2.
Unvaccinated vs Getting Two Doses of Vaccination

	Vaccinated 63.7% (n = 195)	Unvaccinated 36.3% (n = 111)	p*		
Age ¹	41.72 [18 – 74]	30.37 [18 – 59]	<.001		
Education (years) ¹	10.86 [5 – 16]	9.77 [5 – 16]	<.001		
	<i>n (%)</i>	<i>n (%)</i>	<i>p**</i>	OR	95% CI
Gender					
Female	21 (75)	7 (25)	.193	1.793	[0.737 – 4.363]
Male	174 (62.6)	104 (37.7)			
Marriage history					
Yes	138 (75.4)	45 (24.6)	<.001	3.551	[2.178 – 5.788]
No	57 (46.3)	66 (53.7)			
Employment					
Working	104 (75.9)	33 (24.1)	<.001	2.701	[1.647 – 4.431]
Unemployed	91 (53.8)	78 (46.2)			
Substance type					
Alcohol use disorder					
Yes	106 (83.5)	21 (16.5)	<.001	5.104	[2.938 – 8.867]
No	89 (49.7)	90 (50.3)			
Drug use disorder					
No	128 (84.8)	23 (15.2)	<.001	7.310	[4.235 – 12.618]
Yes	67 (43.2)	88 (56.8)			

¹Mean value and minimum-maximum values are given. *Mann – Whitney U-test. The significance level is 0.05. **Pearson chi-square test. The significance level is 0.05. CI, confidence interval; OR, odds rate.

where the study was conducted, and in Türkiye. Vaccination rates were lower in our sample for both doses and weekly compared to the city and country. For the first week of vaccination, first-dose vaccination rates were 60% for the sample, 66.44% for the country and 75.15% for the city. For the 13th week, these percentages were 81%, 89.02%, and 94.05%, respectively, as summarized in Table 5. For the second vaccination dose, 13th-week vaccination percentages were 81% for the sample, 89.02% for the country, and 94.05% for the city. The overall data are summarized in Table 6.

Discussion

Our study provided us with some valuable information regarding vaccination in people with alcohol or SUDs. There were significant differences regarding age, employment, and education between the vaccinated and unvaccinated groups. The mean age of the vaccinated group for the first dose and the second dose was significantly higher, and this finding is consistent with the literature (Jefsen et al., 2021; Sprengholz et al., 2021; Tzur Bitan et al., 2021). Older participants were more likely to get vaccinated,

Table 3.
Unvaccinated vs Getting Two Doses of Vaccination

	B	SE	Wald	OR	p	CI	
Age	0.066	0.019	11.539	1.068	.001	1.028	1.110
Education	0.152	0.056	7.411	1.165	.006	1.044	1.299
Alcohol use	1.095	0.835	1.723	2.990	.189	0.583	15.342
Drug use	1.637	0.805	4.119	5.138	.042	0.1058	24.959
Marriage history	0.492	0.332	2.200	1.646	.138	0.854	3.134
Employment	1.062	0.298	12.667	2.891	.000	1.611	5.187

Summary statistics: Model $\chi^2 = 60.508$ $p = .001$, Hosmer – Lemeshow $\chi^2 = 6.253$ $p = .619$, model accuracy = 73.9%.

Table 4.*The Second Dose of Vaccination within the Participants Who Got the First Dose*

	B	SE	Wald	OR	p	CI
Age	0.073	0.019	15.017	1.076	.000	1.037 1.116
Education	0.172	0.054	10.041	1.187	.002	1.068 1.320
Alcohol use	0.910	0.705	1.667	2.484	.200	.624 9.989
Drug use	0.889	0.696	1.633	2.434	.199	.622 9.524
Marriage history	0.173	0.331	0.274	1.189	.691	.621 2.277
Employment	0.762	0.293	6.757	2.144	.009	1.206 3.809

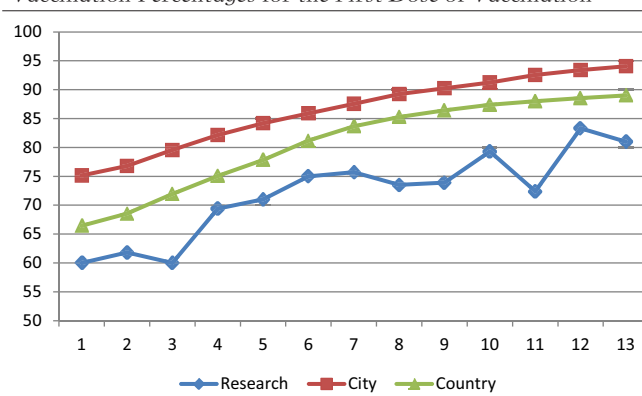
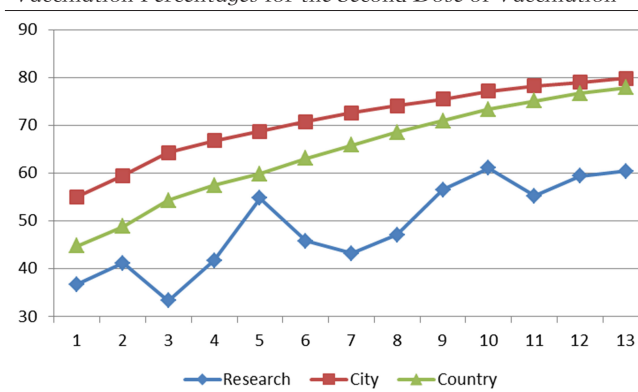
Summary statistics: Model χ^2 : 104.617 $p = .001$, Hosmer – Lemeshow χ^2 : 8.271 $p = .807$, model accuracy: 74.7%.

and as they got older, the chances of getting the vaccination increased by 7% for getting the vaccination and 7.5% for completing the vaccination every year. A recent study showed that vaccine hesitancy is higher in younger groups and associated with lower education (Robertson et al., 2021). Increased acculturation, individualism, and constant exposure to misinformation through social media regarding vaccinations in general could have a negative impact on younger generations. Similarly, in our study, lower total education duration was associated with a lower vaccination rate; as the duration of education increased, the vaccination rate and compliance with the treatment also increased. Every year, the odds increased by 16% for getting the vaccination and 19% for completing the vaccination. This finding is consistent with the literature (Eyllon et al., 2022). One study stated that people with SUD tend to think that the importance of COVID-19 is being exaggerated (H. Huang et al., 2021), and this belief could be reverted with education. Participants with regular jobs were more likely to get vaccinated than those without. These findings are in harmony with some studies that indicate that lower income status is associated with a lower rate of vaccinations (Razai et al., 2021). We did not inspect income status directly, but vaccinated participants were more likely to have regular jobs. This can be interpreted as an important indicator of income status, consistent with the literature. Participants with jobs were 2.5 times more likely to get vaccinated and 2 times more likely to complete the vaccination. Regarding marital status, a relationship between vaccination status and marital status was detected. No marriage history was mainly associated with being unvaccinated, which is again consistent with the literature (Sullivan et al., 2021). This

data lets us speculate that no marriage history is one important risk factor for vaccine hesitancy. According to Amuzie, being single is twice as risky for vaccine hesitancy compared to those who are divorced or widowed (Amuzie et al., 2021). Marriage can be interpreted as a form of social support or bonding. People who have never married may lack this system in their lives, which may create different tendencies to avoid getting vaccinated. It should be noted that societal habits are changing rapidly, so these assumptions should be made carefully. Contrary evidence also exists in the literature. Moola et al. (2021) stated that people who were divorced, separated, or widowed were found to be twice as likely to be vaccine-hesitant than single or unmarried.

We did not find any relationship between sex and vaccination rates. Although some data show no significance of sex on vaccination (H. Huang et al., 2021), other evidence indicates that women are more hesitant about vaccination (Flanagan et al., 2017; Murphy et al., 2021). In our sample, sex distribution was in favor of males. The study was conducted in an alcohol and substance use disorder outpatient clinic; this can be associated with this unequal gender distribution.

The vaccination rate of our sample was lower, for both the first dose and second doses, compared to the general population of İzmir and the general population of Türkiye İzmir is the third largest city in Türkiye in terms of population and overall development and the fifth most developed city in terms of healthcare and services (TC Sanayi ve Teknoloji Bakanlığı Kalkınma Ajansları Genel Müdürlüğü, 2019). As the study was conducted in such a city, the vaccination rate of İzmir was higher than in Türkiye,

Table 5.*Vaccination Percentages for the First Dose of Vaccination***Table 6.***Vaccination Percentages for the Second Dose of Vaccination*

so this finding could give us a chance to argue that people with addiction are especially disadvantaged regarding vaccination. It is very concerning that, even in a city that has much better conditions for healthcare compared to the country average, vaccination rates for people with addiction were much lower than the average population in the country. There is substantial evidence in the literature consistent with this finding (Kaufman et al., 2022; Pulcini et al., 2013). In a recent study in Ireland, it is stated that vaccination is more complicated and less present in people with SUD, and because of that, prioritizing this group of people, regarding education about vaccination, avoiding stigmatization, and encouraging them to get vaccinated is especially important (Powell et al., 2023). In another study, over 70% of people with SUD did not get vaccinated for COVID-19 and are living in riskier conditions for infections (C. Huang et al., 2023). It has been shown that people with SUD were more likely to not attribute any importance to social distancing (Stack et al., 2022; Taylor et al., 2021). Lastly, our findings indicate that the type of SUD is also important regarding vaccination. Participants with substance use were five times less likely to be vaccinated. Participants with alcohol use disorder, compared to other SUDs, were more likely to get vaccinated but not as predictive as substance use when it comes to vaccination. In a recent study in California, people with opioid use have lower vaccination rates compared to other drug use disorders, and especially for this group, it is stated that withdrawal symptoms or cravings are considered more negative consequences than complications of COVID-19 (Masson et al., 2021). Moreover, another study indicated that people with opioid use disorder are more likely to have COVID-19 infection. Also, hospitalization rates and deaths from COVID-19 are higher in this group compared to people with alcohol use disorder and the general population. According to a recent study, adults who engaged in daily alcohol or opioid use reported lower CDC guideline adherence for COVID-19 mitigation, and any opioid use was associated with greater odds of COVID-19 testing, while daily stimulant use was associated with greater odds of COVID-19 infection (Wang et al., 2021). These findings are consistent with our study. To our knowledge, this is one of the few studies exploring vaccination status in people with SUD. Most studies mainly focused on vaccine hesitancy, and we also aimed to gather information about people who drop out of the vaccination process. Lastly, we compared vaccination rates weekly for 13 weeks and compared our sample both with the city and the country. We believe our findings can provide some valuable information regarding this issue.

Our study is not without limitations. Our sample consisted of people with addiction; having a healthy control group with similar sociodemographic characteristics could strengthen our findings. Moreover, all the participants were patients who voluntarily came to a psychiatric clinic to get treatment for SUD. This may have created a selection bias and made it difficult to generalize our findings to the general population. Also, this is a cross-sectional study, so the results should be interpreted cautiously.

Conclusion and Recommendations

Addiction is a significant public health problem with many aspects. Problems like stigmatization are becoming more visible in situations of crisis. Prioritizing this group of people for health

services like vaccinations, screenings, educational organizations, and social programs will help to reduce vaccine hesitancy and increase overall vaccination rates. Preventive approaches could be beneficial for both people with addiction and the public. Further research is needed to discover specific interventions to help people with addiction.

Ethics Committee Approval: This study was approved by the Ethics Committee of Ege University (Approval No: 23-2T*25, Date: 09.02.2023).

Informed Consent: Written informed consent was obtained from the patients who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

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ORIGINAL ARTICLE

Evaluation of the Effect of Fear of COVID-19 on the Prediction of Smoking Cessation Success in Midibus and Minibus Drivers of in Samsun Province

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Main Points

- In our study, more than half of the drivers smoked.
- The pandemic affects the idea of quitting smoking.
- It is thought that COVID-19 can reduce smoking and is an effective psychological fear factor in quitting smoking.

Abstract

The tobacco epidemic is one of the biggest public health threats facing the world. This study aimed to determine the smoking status of minibus drivers in Samsun and evaluate the effect of fear of COVID-19 on the prediction of smoking cessation success. The population of this cross-sectional study consisted of midibus and minibus route drivers in the central districts of Samsun. A questionnaire including COVID-19 status, COVID-19 Fear Scale, Fagerström Nicotine Dependence Test, changes in smoking habits, and Smoking Cessation Success Prediction Scale were applied to the participants. The smoking prevalence of 267 participants was 52.0%, and 1.1% had quit smoking during the pandemic. In this period, 12.2% of the current smokers had decreased their smoking, while 7.2% had increased it. While there was no correlation between the COVID-19 Fear Scale and the Fagerström Nicotine Dependence Test ($p = .163$) and the Smoking Cessation Success Prediction Scale ($p = .645$), there was a significant correlation between the Fagerström Test for Nicotine Dependence and the Smoking Cessation Success Prediction Scale ($p = .005$). The pandemic increases the will and desire to quit smoking and affects individuals in terms of quitting/reducing smoking more than increasing it.

Keywords: Fagerström, fear of COVID-19, pandemic, smoking, smoking cessation success

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Introduction

In December 2019, the city of Wuhan, located in China's Hubei province, became the center of an unknown pneumonia epidemic that attracted attention not only in China but also internationally. This factor, which is the seventh member of the coronavirus family that infects humans, was named "2019-nCoV," and the disease was named "COVID-19" (Wang et al., 2020). In the following days, the COVID-19 infection spread rapidly, became a public health crisis threatening the

world, and was defined as a pandemic by the World Health Organization (WHO) on March 11, 2020 (WHO, 2019).

COVID-19 is a disease that can range from asymptomatic disease to acute respiratory distress syndrome, multi-organ failure, and death (Gavriatopoulou et al., 2020). Risk factors for poor prognosis and mortality include male gender, age over 65, hypertension, diabetes, cardiovascular disease, and respiratory disease (Zhao et al., 2020; Zheng et al., 2020).

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Another prominent risk factor for COVID-19 is smoking (Reddy et al., 2021). More than 1.2 billion people in the world use tobacco products, and more than 7 million people die every year due to tobacco use. It is known that 16 million people smoke in Türkiye. Tobacco and its products play a role in 23% of all deaths in our country and cause 100 thousand deaths per year (Çalışkan & Metintaş, 2018). Both current smoking and smoking history have been proven to significantly increase the severity of COVID-19 and the risk of death. Besides, patients with a smoking history increase the risk of disease progression, need for mechanical ventilation, and in-hospital mortality (Reddy et al., 2021).

COVID-19 is not only a medical condition but also a social phenomenon. During the pandemic, people have experienced fear and stress due to isolation, quarantine practices, curfews, infection of themselves or those around them, hospitalizations, stays in intensive care units, and witnessing deaths. In this unpredictable process, they showed self-protection and avoidance behavior in fear and panic (Gencer, 2020; Koçak et al., 2021).

The present study was planned considering the effect of the fear and panic created by the pandemic on smokers and the possibility that the pandemic may be a factor in smoking cessation. It was conducted on drivers due to the high prevalence of smoking among them (Güler et al., 2016), and all of the participants were male, which is a risk factor for COVID-19. The study aimed to determine the smoking status of minibus and midibus drivers and evaluate the effect of fear of COVID-19 on predicting smoking cessation success.

Material and Methods

The cross-sectional study was carried out between April 20, 2021, and June 7, 2021, with 267 drivers working on the midibus and minibus lines in the central districts of Samsun. The research population consisted of the drivers of 1083 vehicles on the midibus and minibus lines affiliated with the Samsun Chamber of Drivers and Automobile Tradesmen and located in the central districts. In the calculations made with the Minitab program using the results obtained from a similar study, the minimum sample size was calculated as 249 individuals (with 80% power and 5% type 1 error) (Güler et al., 2016). Due to data loss that may occur in the study, it was aimed to increase this number by 10% to reach at least 275 people. A questionnaire was applied to 289 people, but 22 questionnaires with missing data were excluded, and the study was completed with 267 people. The inclusion criteria were volunteering to participate in the study, in addition to being a midibus or minibus driver in the central districts. Data were collected by face-to-face survey method at bus stops. The survey application was completed before June 12, 2021, when the drivers were vaccinated in our country.

The questionnaire form created by the researchers consisted of two parts. In the first part, there were questions about sociodemographic characteristics and smoking status, as well as COVID-19 fear scale questions. In the second part, there were Fagerström Test for Nicotine Dependence (FTND) and Smoking Cessation Success Prediction Scale (SCSPS) questions. Smokers were asked to answer the entire questionnaire, while non-smokers were asked to answer only the first part.

The COVID-19 fear scale, which aims to determine the level of fear during the pandemic process, was developed by Ahorsu et al. (2020). The Turkish validity and reliability of the scale were conducted by Bakioğlu et al. (2020). The scale consists of 7 items with a 5-point Likert-type response. A minimum of 7 and a maximum of 35 points can be obtained from the scale, and the higher the score, the higher the fear of COVID-19.

The Fagerström Tolerance Questionnaire (FTQ) was developed by Fagerström in 1978 to assess nicotine dependence (Vink et al., 2005). However, the questionnaire was revised by Heatherton et al. in 1991, and the FTND used today with higher internal consistency and shorter length has emerged (Heatherton et al., 1991; Sağlam, 2017). Turkish validity of the test was performed by Uysal et al. (2004). A minimum of 0 and a maximum of 10 points are taken from the scale consisting of 6 questions; 0–2 points indicates very little dependence, 3–4 points indicate low dependence, 5 points indicate moderate dependence, 6–7 points indicate high dependence, and 8–10 points indicate very high dependence (Sağlam, 2017).

SCSPS is a scale that predicts the smoking cessation success of individuals. A validity and reliability study was conducted by Aydemir et al. (2019). SCSPS is a 5-point Likert-type scale comprising 10 questions (1, a very low; 2, a few; 3, average; 4, many; and 5, too many). The ninth question of the scale was scored reversely. The maximum score that can be obtained from the scale is 50, and the minimum score is 10. A high score obtained from the scale indicates that the success of smoking cessation will be high.

Ethical approval of the study was obtained from the XOndokuz Mayıs University Clinical Research Ethics Committee (Approval Number: 2021/119, Date: 26.03.2021). Written informed consent was obtained from all participants before the application of the questionnaire.

Statistical Analysis

The study was analyzed using Statistical Package for Social Science (IBM SPSS Corp.; Armonk, NY, USA) version 21.0 software. Categorical variables were presented as numbers and percentages, and continuous variables as mean, standard deviation, median, minimum, and maximum values. Kolmogorov–Smirnov test, Student's *t*, Mann–Whitney *U*, Kruskal–Wallis, ANOVA, and Tukey–HSD tests were used for analysis. The Spearman correlation test was performed to determine the correlations between scale scores. In multivariate analysis, possible independent variables thought to affect the dependent variable were analyzed using logistic regression analysis. Enter method was applied to see all the independent variables in the model. The Hosmer–Lemeshow test was used for model fit, and the Nagelkerke R^2 and Cox and Snell R^2 tests were used for the model's power to explain the dependent variable. The statistical significance level was accepted as $p < .05$.

Results

All 267 drivers participating in the study were male. The mean age was 42.5 ± 11.6 (18.0–67.0) years, while the mean years of driving was 17.0 ± 11.5 (1.0–45.0) years. 79.0% of the drivers were married, and 34.0% were high school graduates. More than

half of the participants (57.7%) perceived their economic situation as “middle-income”; 18.7% of the drivers had chronic diseases. While 38 (14.2%) people had COVID-19 disease, 36 (13.5%) lost their relatives due to this disease; 52.0% of the drivers were still regular smokers. The distribution of some characteristics of the participants is presented in Table 1.

The drivers' COVID-19 Fear scale score was 14.6 ± 6.9 (7.0 – 35.0). While this score was 14.5 ± 6.2 (7.0 – 35.0) in smokers, it was 15.0 ± 7.9 (7.0 – 35.0) in lifelong non-smokers ($p = 0.459$). The FTND score in smokers was 4.5 ± 2.6 (0 – 10.0), and the SCSPS score was

32.5 ± 9.5 (10.0 – 50.0). The rate of very little and little dependence was 52.5%, the moderate dependence rate was 15.8%, and the high and very high dependence rate was 31.7%. No one started smoking during the pandemic period. The answers given by the drivers who still smoked to the questions about how the pandemic affected their smoking habits are summarized in Table 2.

Fifty-five (39.6%) of the participants stated that they wanted to get support to quit smoking, 118 (84.9%) said that they knew that there were smoking cessation outpatient clinics, and 74 (53.2%) knew how to reach these outpatient clinics. Considering the scale scores according to the change in smoking habits, the COVID-19 fear scale score of those who increased smoking during the pandemic and those who did not plan to quit smoking was lower, but the difference was not statistically significant ($p > .05$). While the level of dependence was higher in those who increased their smoking in this period ($p = .001$), those who tried to quit smoking before the pandemic and those who thought about quitting during the pandemic had a higher SCSPS score ($p < .05$) (Table 3).

When the participants were asked about their reasons for quitting smoking during the pandemic, 91.8% stated that it was harmful to their health (Table 4). In this period, one person out of three people who quit smoking chose "Because smoking is harmful to health," one person chose "Because COVID-19 disease is more severe in smokers," and one person chose both "Because COVID-19 disease is more severe in smokers" and "Due to the hikes in cigarettes" as the reason for quitting smoking.

Smoking cessation thoughts (64.3%) were higher in smokers who had COVID-19 ($n = 14$) than those who had no COVID-19 ($n = 66$) (34.0%) and were exposed ($n = 19$) (21.1%) ($\chi^2 = 6.926$; $p = .03$). While 28.6% of those who lost any of their relatives due to COVID-19 ($n = 21$) had thought of quitting smoking during the pandemic period, 36.4% of those who did not ($n = 128$) had thought of quitting ($\chi^2 = 0.484$, $p = .487$).

While 67.3% of those who tried to quit smoking before the pandemic ($n = 55$) had thought of quitting smoking during the pandemic period, 14.3% of those who did not try ($n = 84$) had thought of quitting ($\chi^2 = 40.884$, $p < .001$).

Table 1.

Distribution of Participants' Sociodemographic and COVID-19-Related Characteristics

Variables		Mean	SD
Age (years)		42.5	11.6
Number of children		2.3	1.0
Number of years as a driver		17.0	11.5
		N	%
Marital status	Married	211	79.0
	Single	50	18.7
	Divorced/widow	6	2.3
Educational status	Primary school graduate	84	31.5
	Middle school graduate	49	18.4
	High school graduate	91	34.0
	College/university and above	43	16.1
Economic perception situation	Too bad	39	14.6
	Bad	43	16.1
	Moderate	154	57.7
	Good	31	11.6
Chronic disease status	Yes	50	18.7
	No	217	81.3
Status of contracting COVID-19 disease	Yes	38	14.2
	Treatment at home	34	12.7
	Treatment at hospital	4	1.5
	Exposed	28	10.5
	No	201	75.3
Losing a loved one due to COVID-19	Yes	36	13.5
	No	231	86.5
Smoking status	I have never smoked	80	30.0
	I smoked once or several times	20	7.5
	I used to smoke	25	9.4
	I quit before the pandemic		
	I quit during the pandemic	3	1.1
	I still use it regularly	139	52.0
Total		267	100.0

Table 2.

The Change in the Smoking Habits of the Drivers During the Pandemic

Questions		n	%
Change in smoking habits during the pandemic period	No change in my smoking frequency	112	80.6
	My smoking frequency has increased	10	7.2
	My smoking frequency has decreased	17	12.2
Trying to quit smoking before the pandemic	Yes	55	39.6
	No	84	60.4
Consideration of quitting smoking during the pandemic period	Yes	49	35.3
	No	90	64.7

Table 3.
The Relationship Between the Changes in the Smoking Habits of the Drivers During the Pandemic and the Scale Scores

Questions	COVID-19 Fear Scale			FTND			SCSPS		
	Median (Minimum – Maximum)	p		Median (Min – Maximum)	p		Median (Minimum – Maximum)	p	
Change in smoking habits during the pandemic period	No change	.607*		5.0 (0.0 – 10.0)	.001*		32.0 (10.0 – 50.0)	.055*	
	Increased			7.0 (2.0 – 10.0)			35.0 (10.0 – 46.0)		
	Decreased			3.0 (0.0 – 5.0)			38.0 (25.0 – 50.0)		
Trying to quit smoking before the pandemic	Yes	.581**		3.0 (0.0 – 10.0)	.060**		37.3 ± 7.7 [§]	<.001***	
	No			5.0 (0.0 – 10.0)			29.3 ± 9.3 [§]		
Consideration of quitting smoking during the pandemic period	Yes	.095**		3.9 ± 2.4 [§]	.064***		38.3 ± 7.4 [§]	<.001***	
	No			4.8 ± 2.6 [§]			29.3 ± 9.0 [§]		

Note: FTND = Fagerström Test for Nicotine Dependence; SCSPS = Smoking Cessation Success Prediction Scale.

*Kruskal – Wallis test.

**Mann – Whitney U-test.

***Student's t test.

[§]Mean ± SD.

Table 4.
Reasons for the Thought of Quitting Smoking During the Pandemic Period

Answers	n	%
Because smoking is harmful to health	45	91.8
Because COVID-19 disease is more severe in smokers	18	36.7
Due to price hikes in cigarettes	15	30.6
Due to the economic difficulties experienced as a result of the restrictions applied during the pandemic period.	14	28.5
Bothered by the smell	6	12.2
Due to smoking bans in closed areas	5	10.2
Individuals' beliefs	4	8.1
Other	1	2.0

Of those who thought of quitting smoking during the pandemic, 26.5% said that they reduced their smoking frequency, while 8.2% increased their smoking frequency, and 65.3% stated no change in their smoking frequency. While 61.2% of those who thought of quitting smoking wanted support from smoking cessation outpatient clinics, 38.8% did not.

There was no significant correlation between the COVID-19 Fear Scale score and the FTND score ($p = .163$, $r = .119$) and the SCSPS score ($p = .645$, $r = .039$). A correlation was determined between the FTND score and the SCSPS score, but it was very weak and negative ($p = .005$, $r = -.236$).

When the SCSPS scores of the current smokers were compared according to some characteristics (Table 5), the scale scores of those with middle-income economic perception status (34.10 ± 9.29) were higher than the other groups ($p = .021$). There was no significant difference between the change in smoking habits during the pandemic and SCSPS scores ($p = .055$). Those who tried to quit smoking before the pandemic ($p < .001$), those who thought of quitting smoking during the pandemic period ($p < .001$), and those who wanted to get support from smoking cessation outpatient clinics ($p < .001$) had higher SCSPS scores.

In further analysis, it was determined that the SCSPS scores of those who wanted to receive support from smoking cessation outpatient clinics were 3.3 times higher ($p = .007$). In addition, a one-unit increase in the FTND score decreased the SCSPS scores by 17% ($p = .026$) (Table 6).

Discussion

In this study, it can be considered that the COVID-19 fear levels of the participants were low. Since studies specifically involving the driver population could not be found, comparing our results with different groups in the literature suggests that the average score in our study is lower (Bakioğlu et al., 2020; Gencer, 2020; Gritsenko et al., 2021; Kalafatoğlu & Yam, 2021; Koçak et al., 2021). We believe this may be because the study was conducted approximately one year after the pandemic began. During this time, many people or those around them contracted the disease, their fear levels decreased after surviving it, and society became

Table 5.*Comparison of SCSPS Scores of Current Smokers According to Sociodemographic and COVID-19-Related Characteristics*

SCSPS Score				
Parameters		Mean $\pm$ SD	Median (Minimum – Maximum)	<i>p</i>
Age (years)	30 years and below	31.2 $\pm$ 8.3	32.5 (10.0 – 46.0)	.359*
	30 – 44	33.4 $\pm$ 9.8	35.0 (10.0 – 50.0)	
	45 – 59	31.4 $\pm$ 9.9	31.0 (10.0 – 50.0)	
	60 years and over	35.5 $\pm$ 8.3	38.0 (23.0 – 44.0)	
Childbearing status	Yes	33.0 $\pm$ 9.6	34.0 (10.0 – 50.0)	.207**
	No	30.6 $\pm$ 9.0	31.5 (10.0 – 46.0)	
Marital status	Married	33.0 $\pm$ 9.3	34.0 (10.0 – 50.0)	.326*
	Single	29.7 $\pm$ 9.6	30.0 (10.0 – 46.0)	
	Divorced-widow	34.2 $\pm$ 14.2	35.5 (16.0 – 50.0)	
Educational status	Primary school graduate	32.6 $\pm$ 9.8	33.0 (10.0 – 49.0)	.726***
	Middle school graduate	33.7 $\pm$ 8.9	36.0 (10.0 – 50.0)	
	High school graduate	32.4 $\pm$ 9.5	34.0 (10.0 – 50.0)	
	College-university and above	30.5 $\pm$ 10.0	29.5 (10.0 – 50.0)	
Economic perception status****	Very bad (a)	28.1 $\pm$ 10.4	30.0 (10.0 – 46.0)	.021***
	Bad (b)	33.5 $\pm$ 8.8	36.0 (19.0 – 50.0)	
	Middle (c)	34.1 $\pm$ 9.2	36.0 (10.0 – 50.0)	
	Good (d)	28.2 $\pm$ 8.1	26.0 (18.0 – 43.0)	
Chronic disease status	Yes	32.2 $\pm$ 8.1	31.5 (18.0 – 50.0)	.560**
	No	32.5 $\pm$ 9.8	34.0 (10.0 – 50.0)	
Status of contracting COVID-19 disease	Yes	36.0 $\pm$ 11.7	41.0 (10.0 – 49.0)	.237*
	Exposed	31.5 $\pm$ 7.5	30.0 (18.0 – 46.0)	
	No	32.2 $\pm$ 9.5	33.5 (10.0 – 50.0)	
Losing a loved one due to COVID-19	Yes	32.3 $\pm$ 7.6	31.0 (20.0 – 46.0)	.784**
	No	32.5 $\pm$ 9.8	34.0 (10.0 – 50.0)	
Change in smoking habits during the pandemic period	No change in my smoking frequency	31.81 $\pm$ 9.46	32.00 (10.0 – 50.0)	.055*
	My smoking frequency has increased	31.40 $\pm$ 12.22	35.00 (10.0 – 46.0)	
	My smoking frequency has decreased	37.70 $\pm$ 6.80	38.00 (25.0 – 50.0)	
Trying to quit smoking before the pandemic	Yes	37.36 $\pm$ 7.70	38.00 (18.0 – 50.0)	<.001****
	No	29.32 $\pm$ 9.31	29.00 (10.0 – 49.0)	
Consideration of quitting smoking during the pandemic period	Yes	38.32 $\pm$ 7.44	38.00 (23.0 – 50.0)	<.001****
	No	29.33 $\pm$ 9.07	29.00 (10.0 – 48.0)	
Requesting support from smoking cessation outpatient clinics	Yes	38.12 $\pm$ 7.42	38.00 (24.0 – 50.0)	<.001****
	No	28.82 $\pm$ 8.99	29.50 (10.0 – 46.0)	

Note: **Mann – Whitney *U* test.

***ANOVA test.

****Student's *t* test.*****Tukey-HSD (ac), *p* = .046.

accustomed to pandemic conditions. Much of this study was carried out after a nationwide lockdown was declared, and the decrease in the number of cases following the lockdown may have led to a lower level of fear in our study group.

The increase in anxiety due to increased death rates during the pandemic period, unemployment and economic concerns, the fear

of losing health, the possibility of getting sick loved ones, and the feeling of loneliness brought about by quarantine and social distance practices are defined as “Coronaphobia” in the literature (Ozcelik & Kara, 2020). When smoking is added to this situation as a risk factor for COVID-19 disease (Reddy et al., 2021), the pandemic may have affected smokers to reduce or quit smoking (Gold et al., 2021). On the contrary, the increase in the need to

Table 6.
Logistic Regression Analysis of Factors That May Affect SCSPS Scores

Independent Variables in the Model		OR	95% CI	p
Age		0.999	0.961-1.040	0.977
COVID-19 Fear Scale		1.014	0.946-1.088	0.691
FTND		0.830	0.704-0.978	0.026
Economic perception situation	Good (reference)	-	-	-
	Middle	0.983	0.229-4.224	0.981
	Bad	1.238	0.244-6.283	0.797
	Too bad	0.566	0.102-3.139	0.515
COVID-19 status	No (reference)	-	-	-
	Exposed	0.730	0.225-2.370	0.601
	Yes	0.887	0.205-3.841	0.872
Losing a loved one due to COVID-19	No (reference)	-	-	-
	Yes	0.660	0.203-2.144	0.489
Have you ever tried to quit smoking before the pandemic period?	No (reference)	-	-	-
	Yes	2.103	0.821-5.385	0.121
Have you ever thought of quitting smoking during the pandemic period?	No (reference)	-	-	-
	Yes	2.483	0.907-6.794	0.077
Would you like to receive support from smoking cessation outpatient clinics?	No (reference)	-	-	-
	Yes	3.281	1.381-7.794	0.007

relieve tension and anxiety would increase the use of cigarettes (Vanderbruggen et al., 2020). In our study, 12.2% of current smokers decreased their tobacco use during the pandemic, while 7.2% increased it. Our study supports that smoking tends to decrease more during the pandemic period. A substantial portion of our study group (35.3%) wanted to quit smoking during the pandemic and declared they were ready to receive support (39.6%). Of those who wanted to quit smoking, 36.7% thought of quitting "because the COVID-19 disease is more severe in smokers" and 28.5% "due to the economic difficulties experienced as a result of the restrictions applied during the pandemic period." Similar to our study, in a study investigating the effect of COVID-19 on smoking patterns, 68.9% of the participants reported that they smoked less than normal in the last 28 days. This study revealed that as the fear of COVID-19 increased, the motivation to quit smoking increased (Gold et al., 2021). In our study, there was a significant relationship between the thought of quitting smoking during the pandemic period and the change in smoking habits, and 26.5% of those who thought of quitting smoking during the pandemic period reduced their smoking frequencies. Furthermore, the rates of smoking cessation thoughts in smokers who had had COVID-19 (64.3%) were higher than in those who had not had COVID-19 (34.0%) and who were exposed (21.1%) ($p = 0.03$). This information suggests that COVID-19 may reduce smoking and is an effective psychological fear factor in smoking cessation.

In a study performed with university students in Brazil, higher fear scores were determined in tobacco users than in non-smokers ($p = .039$). Although those with increased tobacco use had higher fear scores than those with decreased use, no significant relationship was found (Modena et al., 2021). In our study, no significant

difference was observed between smokers and non-smokers regarding fear levels. However, although there was no significant relationship with the change in smoking during the pandemic, the fear levels were higher in those who reduced their smoking. This result supported our idea that those who reduced their smoking had a higher level of fear and could reduce their use of cigarettes with fear psychology. A study from England demonstrated that the quarantine did not cause a significant change in the prevalence of smoking, but there was an increase in quit attempts and quit success among smokers in the last year (Jackson et al., 2021).

Many studies indicate that health-related reasons are a critical motivator for smoking cessation. Health-related conditions such as personal health problems, future health concerns, illness of a family member, and doctor's advice are considered crucial motivations to quit smoking (Esen et al., 2018; McCaul et al., 2006; Sieminska et al., 2008). In a study performed before the pandemic, 76.9% of the cases wanted to quit smoking due to fear of disease, 19.7% for economic reasons, and 17.3% because of their current illness. Worrying about being sick in the future is determined to be the most common reason for quitting smoking. Moreover, health anxiety was significantly higher among those who wanted to quit smoking due to fear of contracting a disease (Esen et al., 2018). Similarly, in our study, the reasons for considering quitting smoking included the harmful effects on health (91.8%) and the more severe course of COVID-19 in smokers (36.7%). This suggests that before the pandemic, health concerns were a key motivation for quitting smoking, and the COVID-19 infection heightened these concerns. Supporting this, a study conducted on patients at a smoking cessation outpatient clinic found a significant relationship between awareness of the higher mortality rate

from COVID-19 among smokers and changes in smoking behavior due to the pandemic (Altuntaş et al., 2022). In our country, the success rate of smoking cessation in the ninth month was 55.0% in patients hospitalized due to COVID-19, based on follow-ups after they were discharged from the hospital (Turan et al., 2020).

According to the 2019 data from the Türkiye Health Survey, while the rate of individuals aged 15 and over who use tobacco every day in our country was 26.5% in 2016, it increased to 28.0% (41.3% for men and 14.9% for women) in 2019 (TSI, 2020). The prevalence of smoking in our study was 52%, higher than the Türkiye average. It has been reported that drivers' smoking frequency and nicotine dependence were higher than the general population and different occupational groups (Güler et al., 2016). The prevalence of smoking in our study is higher than the values given for the male population in Türkiye, which is in line with previous studies. In a study conducted in Aydın, 68.1% of the drivers were determined to smoke, and in a study from Mardin, 74% of the drivers smoked (Bayar & Can, 2020; Durmaz & Ozvurmaz, 2021).

When our study was evaluated regarding nicotine dependence, the FTND score was 4.5 ± 2.6 (median = 4.0). The rate of very little and low dependence was 52.5%, the moderate dependence rate was 15.8%, and the high and very high dependence rate was 31.7% in total. A study performed in Sivas stated that 69.9% of the drivers smoked, and according to FTND, it was reported that 39.9% were highly dependent, 47.9% moderately dependent, and 12.2% mildly dependent (very little and low) (Güler et al., 2016). Considering this study, we determined that our study group showed slightly lower values both in terms of prevalence and level of nicotine dependence. Given that smokers were unwilling to participate in the study and did not engage in the observations, we believe the prevalence of smoking and nicotine dependence levels in our population may be higher. The drivers work in a more stressful environment, influenced by long working hours, heavy traffic, and exposure to external factors such as vibration, noise, and exhaust fumes. Additionally, the repetitive nature of their job, which requires constant attention, and peer influence in smoking may contribute to their high levels of smoking and nicotine dependence (Güler et al., 2016).

In a study performed with patients admitted to the smoking cessation outpatient clinic, the mean SCSPS scores of the participants were 42.8 ± 4.5 (median = 44) (Tanımlı, 2020). These scores were higher than the scores in our study [32.5 ± 9.5 (median = 33)]. Considering that people who are willing to quit smoking and have a higher belief that they can quit smoking apply to smoking cessation outpatient clinics, it is an expected result to have higher SCSPS scores compared to our study group. In the same study, it was observed that those who quit smoking as a result of the treatments had higher SCSPS scores than those who could not quit. The scale score was not affected by gender ($p = .089$), marital status ($p = .135$), and education level ($p = .542$), and those without cardiovascular and respiratory diseases had a significantly higher SCSPS score than those with comorbidities ($p = .03$) (Tanımlı, 2020). Consistent with this study, we could not determine a relationship between SCSPS scores and age, marital status, and educational status in our study. Although the idea that chronic diseases can motivate people to quit smoking is common, in the study conducted by Tanımlı (2020), the SCSPS scores of those without chronic diseases were significantly higher.

However, although the percentage of chronic disease was lower in the group who quit smoking in the follow-ups, no significant difference was observed between the presence of chronic disease and the success of quitting (Tanımlı, 2020). In our study, no significant relationship was found between the SCSPS score and the presence of chronic disease. Similarly, Argüder et al. (2013) found no significant relationship between chronic disease and smoking cessation. In contrast, Önen et al. (2011) reported a lower smoking cessation rate in patients with cardiopulmonary disease.

Patients who are admitted to the smoking cessation outpatient clinic are mostly aware of this dependence and apply to the outpatient clinic for help in this regard (Uzer & Uzun, 2020). On the other hand, we wanted to investigate the wishes and desires of any segment of society regarding smoking cessation. Our study revealed that 39.6% of smokers wanted support from smoking cessation outpatient clinics, and in the logistic regression analysis, SCSPS scores were 3.3 times higher in those who wanted support from smoking cessation outpatient clinics ($p = .007$). These results suggest that some people have not applied to smoking cessation outpatient clinics yet but intend to quit smoking.

Studies have reported that tobacco use in Türkiye is inversely proportional to the income level of men, and the success of smoking cessation is positively correlated with income (Elbek et al., 2021). In our study, on the other hand, we found a significant relationship between the SCSPS score and the state of economic perception, and that the SCSPS scores of those with very bad or very good economic perceptions were lower. People with a very bad economic perception may have received lower SCSPS scores due to the economic crisis and stress experienced during the pandemic. Those with good economic perception were less affected by the pandemic, and even though their nicotine dependence levels were lower, their SCSPS scores also indicated lower values.

A study performed during the pandemic in Türkiye reported that 31.9% of the participants had decreases in smoking behavior, while 25.8% quit smoking completely. The presence of people infected with the virus near the participants and the working status that generates active income have been determined as the variables that increase the individual's success in quitting smoking. There was no significant relationship between SCSPS scores and age and educational status (Cıtağ Ş, 2021). These findings were consistent with our findings.

Tanımlı's (2020) study did not determine a substantial correlation between SCSPS score and FTND score ($p = .321$, $r = .056$). Contrary to this study, we observed a significant difference in the correlation between FTND and SCSPS, but the correlation level was very weak and negative ($p = .005$, $r = -.236$) (Tanımlı, 2020). Of course, with the scores obtained from these scales, whether people can quit smoking or a precise cut-off value for this cannot be determined. However, we aim to predict people more likely to quit with these scales.

The present study could not demonstrate a relationship between the fear of the COVID-19 scale and SCSPS and FTND. Moreover, we could not determine a significant relationship between having COVID-19 disease and losing any of their relatives due to COVID-19 and the SCSPS score. We considered that the reason why we could not find a relationship was that with the adaptation

to the process, the pandemic is no longer a fear factor, and the desire to live healthily may have replaced the fear. We found no study investigating the relationship between anxiety, stress, and fear levels and FTND during the COVID-19 pandemic. When similar scales were evaluated, no correlation was observed between the health anxiety scale score and the FTND score in a study conducted before the pandemic ($p = .422$). The mean health anxiety score of those who wanted to quit smoking due to fear of disease was significantly higher ($p = .023$). In the same study, no significant relationship was determined between high nicotine dependence levels and health anxiety, and high health anxiety was observed in those who wanted to quit smoking due to fear of disease (Esen et al., 2018).

Limitations

The results of the research cannot be generalized to the population due to the natural limitation of cross-sectional studies. The time spent during the pandemic, the adaptation of people to the pandemic conditions, and the fact that the study may have been conducted when the number of cases decreased after the full lockdown may have affected the scale scores. Furthermore, the fact that people who smoked more and were possibly more addicted to nicotine and did not want to participate in the study and may also have impacted our results. As a strength of our study, the questionnaires were conducted face-to-face. We believe that the fact that our group consisted of people who had not sought help to quit smoking may also provide valuable for smoking cessation studies.

Although various factors affected the level of fear during the pandemic, it could not be determined that the fear of COVID-19 and related factors effectively predicted smoking cessation success. However, the will and desire to quit smoking increased during the pandemic, and individuals were more ready to quit smoking and receive support from smoking cessation polyclinics. In conclusion, the pandemic period should start a new era in the fight against smoking. Projects and health policies to be developed during and after the pandemic should be performed more carefully, and this situation should be turned into an opportunity. Required smoking cessation support lines, awareness, and the number of outpatient clinics should be increased for those who want to quit smoking, and they should be accessible to the public. Besides, within the scope of smoking cessation studies, training should be given to some risky occupational groups, and people with the intention and desire to quit smoking should be guided.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Ethics Committee Approval: This study was approved by the Ethics Committee of Ondokuz Mayıs University (approval number: 2021&119; date: 26.03.2021).

Informed Consent: Written informed consent was obtained from the participants who agreed to take part in the study.

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ORIGINAL ARTICLE

Processes of Change Questionnaire Smoking Version: Psychometric Evidence of Validity and Reliability in Turkish Culture

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Abstract

The aim of this study is to adapt the Processes of Change Questionnaire Smoking Version: Short Form into Turkish. The study comprised 1070 adults from three different samples. The results of the pilot study showed that the translated version was understood well by the Turkish sample. An exploratory factor analysis revealed that the 20-item scale had a 10-factor structure and explained 64.33% of the variance. The confirmatory factor analysis results indicate that the 10-factor model and the two-factor model fit the data well with the Turkish sample. In the reliability analysis, the alpha and omega consistency coefficients of all dimensions ranged from 0.54 to 0.90, besides the test – retest correlation coefficients ranged from 0.34 to 0.75. These results indicate that the reliability of the scale is acceptable. The current study provides evidence that the Turkish version of the PCQ-SV is a reliable and valid instrument to determine smoking behaviors among adult smokers.

Keywords: Addiction, reliability, scale adaptation, smoking, validity

Introduction

Tobacco use is one of the preventable major health problems that claims over 8 million lives worldwide each year (World Health Organization, 2022a). Approximately 7 million of these deaths can be directly linked to tobacco use, and an additional 1.2 million deaths can be attributed to second-hand smoke exposure (World Health Organization, 2022b). Currently, it is estimated that 175 million women and 942 million men aged 15 and over smoke worldwide (Drope et al., 2018). In line with this, according to a recent report from the Turkish state statistical institute, 41% of men, 14% of women, and 28% of the entire population aged 15 years and older smoke in Türkiye (TUIK, 2019). Tobacco

addiction is a substance use disorder according to the American Psychiatric Association's (2013) diagnostic criteria and is considered one of the main causes of deaths and diseases due to substance use disorders (Ziedonis et al., 2006).

Various intervention programs have been developed to help people quit smoking, but they have not been found successful enough (West, 2017). A considerable majority of smokers quit smoking on their own without professional help (Etter et al., 2000). Those who quit smoking by their own efforts reported using more successful strategies to prevent relapse (Perri et al., 1977). Providing information on how to quit smoking with self-help and how to prevent relapse may be helpful in developing

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more effective intervention models to quit smoking (Prochaska et al., 1992).

Successful strategies for quitting smoking are often characterized by some specific behavioral change models (Prochaska & Velicer, 1997). One of these models is the transtheoretical model (TTM). The model, built on stages of change, explains how people change a problematic behavior or acquire a positive behavior (Velicer et al., 1998). The main components of the TTM are the stages of change that include “precontemplation,” “contemplation,” “preparation,” “action,” “maintenance.” Moreover, the processes of change, such as “consciousness stimulation,” “emotional arousal,” “self-reappraisal,” “environmental reappraisal,” “personal enlightenment,” “getting help from relationships,” “counter-conditioning,” “stimulus control,” “reinforcement management,” and “social enlightenment,” are the other components of the model (Prochaska & DiClemente, 1982).

Over the past few decades, research and experiments have suggested that TTM is a guiding model with its theoretical framework dimension in changing smoking, overeating, and physical exercise behaviors and in realizing these changes (DiClemente et al., 1991). In this regard, various tools have been developed to measure the extent to which TTM can change people’s lifestyles (e.g., physical activity, nutrition, weight loss, and smoking). Accordingly, Hoepfner et al. (2006) developed a short form to measure the stages of change in adolescents’ smoking cessation processes. It is anticipated that this assessment method can also be employed for evaluating particular habits like diet and reducing sun exposure.

A review of the literature reveals that some TTM-based scales have already been adapted to Turkish culture. One of them is the short form developed by Hoepfner et al. (2006) to measure the stages of change in adolescents’ smoking cessation processes, and it was adapted to Turkish culture by Çelik (2014). Another measurement tool is the Decision-Making Balance Scale developed by Velicer et al (1985) and was adapted to Turkish culture by Yalçınkaya-Alkar and Karanci (2007). Next, the Fagerström Nicotine Addiction Scale developed by Fagerstrom and Schneider (1989) was adapted into Turkish by Uysal et al. (2004). Furthermore, the Self-Efficacy Scale developed by Velicer et al. (1990) to measure an individual’s ability to stop smoking and success in changing his/her behavior was adapted to Turkish culture by Erol (2005). Apart from the adaptation studies, Erdogan and Kurcer (2020) also developed the Smoking Cessation Scale According to the Health Belief Model (SCS-HBM) in the Turkish language. However, a number of different scales that directly relate smoking behavior to the stages of change model have been developed in various contexts (Sarbandi et al., 2013; Velicer et al., 1985). Such instruments provide concrete information about the stages of planned behavior. It is apparent that there is a dire need for measurement tools that can be used for planned behavior change studies in Türkiye, where the prevalence of tobacco use is still an important public health problem. All in all, it is of cardinal importance to develop scales or adapt existing scales to Turkish culture in order to provide specific criteria for reducing or quitting tobacco use.

The Processes of Change Scale Cigarette Form focuses on the change processes of individuals at five different smoking

cessation stages, which are “precontemplation,” “contemplation,” “preparation,” “action,” and “maintenance” (Prochaska et al., 1988). This measurement instrument was developed based on data obtained from both current smokers and individuals who quit smoking by their own efforts. The scale is basically a self-report scale consisting of two main factors: experiential (cognitive) processes and behavioral processes, with 10 factors under each factor. The scale has been adapted to different cultures and used in numerous studies on smoking addiction (Hoepfner et al., 2006; Sarbandi et al., 2013; Yasin et al., 2011). There is no Turkish culture-adapted version available for a smoking scale based on Processes of Change prepared for the adult age group in Türkiye. The aim of this study is to carry out the psychometric procedures necessary for the adaptation of the short form (Fava et al., 1991) of the Smoking Version of the Processes of Change Scale, which was developed by Prochaska et al. (1988) based on the transtheoretical model into Turkish culture. It is believed that the adaptation of this scale, which is used widely in different societies, into Turkish culture will contribute to both the research literature in Türkiye as well as international comparative studies.

Material and Methods

Methodology

Participants

Three separate groups of subjects were recruited for different stages of the study. The piloting group consisted of 316 adults aged 18 – 72 years (mean = 34.79, SD = 10.75). Exploratory factor analysis (EFA) was performed with the second set of 403 adults between the ages of 18 and 61 (mean = 30.51, SD = 10.43). Confirmatory factor analysis (CFA) of the main study was tested with the last group of 351 adults between the ages of 18 and 63 (mean = 30.77, SD = 10.47). The pilot study and actual factor analyses were conducted on the data gathered from these three separate groups of participants. It should be noted that the participants were recruited by convenience sampling. Only smokers and former smokers who had quit smoking were included in the study. Information on demographics and smoking experiences of the research groups is presented in Table 1.

Measuring Instruments

Personal Information Form

The researchers created the form in order to gather certain demographic data about the participants and included questions about gender, age, education level, smoking status, average number of cigarettes smoked per day, smoking duration, previous attempts at quitting, and current smoking cessation attempt.

Processes of Change Scale Cigarette Version-Short Form

The Processes of Change Scale Cigarette Version-Short Form (PCS-CV-SF) focuses on the change processes of individuals in five different stages of smoking cessation (“precontemplation,” “contemplation,” “preparation,” “action,” and “maintenance”) (Fava et al., 1991; Prochaska et al., 1988). The measuring instrument was developed based on data obtained from both current smokers and individuals who quit smoking with self-help. The scale consists of 10 factors (“Consciousness Raising,” “Dramatic Relief,” “Self Re-evaluation,” “Environmental Re-evaluation,” “Self Liberation,” “Helping Relationships,” “Counter Conditioning,” “Stimulus Control,” “Reinforcement

Table 1.
Information on Participants' Demographics and Smoking Experiences

	Pilot Study Sample		Main Study EFA Sample		Main Study CFA Sample	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Gender						
Female	145	45.9	191	47.4	181	51.6
Male	171	54.1	212	52.6	170	48.4
Education level						
Primary school and below	7	2.2	3	0.7	3	0.9
Secondary school	6	1.9	8	2.0	4	1.1
High school	37	11.7	33	8.2	33	9.4
University	204	64.6	312	77.4	263	74.9
Post-graduate	62	19.6	47	11.7	48	13.7
Smoking status						
Occasionally	61	19.3	129	32.0	119	33.9
At least 1 cigarette a day	218	69.0	211	52.4	181	51.6
I used to smoke but I quit	37	11.7	63	15.6	51	14.5
Duration of smoking						
Less than 1 year	14	4.4	53	13.2	46	13.1
1 – 3 years	22	7.0	60	14.5	55	15.0
3 – 5 years	34	10.8	71	18.0	61	18.1
5 years and above	246	77.8	219	54.3	189	53.8
Average number of cigarettes smoked per day						
1 – 10 pcs	118	37.3	209	39.2	160	45.6
11 – 20 pcs	112	35.4	159	38.9	125	35.6
More than 20 pcs	55	17.4	35	9.2	26	7.4
I don't smoke right now	31	9.8	51	12.7	40	11.4
Stages of change						
Pre-contemplation	171	54.1	184	45.7	193	55.0
Contemplation and preparation	109	34.5	130	32.3	93	26.5
Action and maintenance	36	11.4	89	22.0	65	18.5
Total	316	100	403	100	351	100

Note: CFA, confirmatory factor analysis; EFA, exploratory factor analysis.

Management,” and “Social Liberation”) and includes five-point Likert type items. The first five of these sub-factors constitute a dimension under the name of experiential (i.e., thought-related) processes, while the other five sub-factors are grouped under the name of behavioral processes. The construct validity coefficients of the factors obtained from the long version of the scale vary between 0.34 and 0.72. The two lowest coefficients appeared on the factors of self-liberation (0.36) and social-liberation (0.34). The correlation coefficient between the sub-factors of the scale is 0.30. Cronbach alpha (α) internal consistency coefficients were calculated for each of the factors separately and it was found that the coefficients varied between 0.69 and 0.72. Six months after the first data collection, data were collected from another sample for a second time to conduct the CFA with the LISREL IV computer software. The analysis resulted in a model linking

two secondary factors with 10 primary factors (Prochaska et al., 1988).

Procedure

Necessary permissions were obtained from the scale owners for the Processes of Change Scale Cigarette Form to be adapted to Turkish culture. Ethics approval was granted by Trabzon University (No: E-81614018-000-2200011483, date: 2022). Then, the scale adaptation stages suggested by Hambleton (1996) were implemented. The first stage involved translating the scale items from the original language (English) into the target language (Turkish). For this purpose, in the first translation of the scale, four different experts who have a good command of both languages and cultures and who also have experience in scale development and adaptation independently translated the scale items

into Turkish. Afterward, the consistency between the translations was examined by a group of faculty members working in the psychological counseling, Turkish, and English as a foreign language teaching departments, and thus the Turkish form of the scale was created. This Turkish form was also translated back into English by an independent translator who has a good command of English and Turkish. The Turkish form of the scale was revised by the researchers by re-examining whether there were any inconsistencies between the original items of the scale and the back translation. The language and content validity of the final Turkish form was evaluated by a group of 10 experts working in the departments of English as a foreign language teaching, Turkish language teaching, psychological counseling, and assessment and evaluation. A pilot study was conducted with the Turkish form of the scale approved by the expert group. In addition to scoring the scale items, the participants in the pilot study were also asked to express their opinions about the items that were not easily understood. The data obtained were analyzed and the items were found to be linguistically and psychometrically appropriate. After these procedures, the final version of the Turkish form of the PCS-CV-SF was created and the data collection phase for the main study began.

Adult volunteer smokers and quitters were recruited to participate in the study by convenience sampling. Online forms (Google Forms) were utilized in the data collected from all around Türkiye. Before the survey, a consent form that explained the purpose and scope of the study and participant rights was presented to the participants. In compliance with ethical rules, data were collected anonymously, and only those who wanted to participate in the retest study were asked to provide their contact information.

Data Analysis

IBM Statistical Package for social sciences (IBM SPSS Corp.; Armonk, NY, USA) 26 and Analysis of moment structures (AMOS) 20 programs were used to analyze the data in this adaptation study. Before proceeding with the analyses of the study, normality tests were computed for the data obtained for the SCS-SV, and the kurtosis values were found to be -0.21 , -0.11 , and -0.01 , and skewness values were found to be 0.10 , 0.17 , and 0.04 for the pilot, EFA, and CFA samples, respectively. The obtained kurtosis and skewness coefficients were within acceptable ranges (± 1) (Tabachnick & Fidell, 2015).

Cronbach's α and McDonald's ω were calculated for the reliability of the scale. In addition, its reliability over time was also tested with the test – retest model. Validity of these measures was established through EFA and CFA. In determining the adequacy of the model tested with CFA, chi-square goodness, goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), CFI, root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) were used (Byrne, 2010).

Findings

Findings of the Pilot Study

A pilot study was conducted to see whether the Turkish form of the scale was understood by the adult sample and how the scale items were evaluated. Initially, the data obtained from the pilot study were tested with Kaiser – Meyer – Olkin (KMO) and Bartlett tests to find out whether they were at an adequate level

for factor analysis. Results revealed that the data set was suitable for factor analysis ($KMO = 0.85$ and Bartlett $X^2 = 2547.97$, $df = 190$, $p < .001$). Based on the principal axes analysis using the promax rotation method, it was determined that the 10-factor structure explained 64.76% of the total variance. It was also found that the items were distributed in a way that was exactly compatible with the 10 factors in the original form of the scale. Among the items with factor loadings ranging between 0.35 and 0.97, only item 7 cross-loaded on two factors. Confirmatory factor analysis was conducted for the 10-factor structure obtained from the pilot study data. The goodness of fit values obtained after the suggested modifications were made are as follows: X^2/df 1.72 ($X^2 = 215.18$, $df = 125$, $p < .001$), RMSEA = 0.05, GFI = 0.94, AGFI = 0.90, CFI = 0.96, SRMR = 0.04. These results indicate a good fit of the model to the data.

At this stage, the reliability values of the scale were tested. The internal consistency coefficient calculated for the whole scale was $\alpha = 0.88$ and $\omega = 0.89$. Item – total correlations were calculated, and the values were found to be in the range of 0.88 – 0.89. Thus, it was determined that removing any item would not create a significant change in internal consistency. Moreover, the reliability values calculated for the sub-factors ranged between 0.55 and 0.81.

In line with the findings obtained from the validity and reliability analysis of the pilot study, cross-loaded items, items with reliability values slightly below the expected values, and items that were found to be confusing by the participants during the application were re-examined. Some wording revisions were made to the items by the researchers of the project, and the final version of the Turkish form to be used in the main study was created.

Findings Regarding the Construct Validity of the Processes of Change Scale Cigarette Version-Short Form

Exploratory factor analysis was conducted to test the construct validity of the PCS-CV-SF. Initially, KMO coefficient and Bartlett's sphericity test results were examined to test the suitability of the data obtained from the EFA sample for factor analysis. The obtained values show that the sample suitability is sufficient ($KMO = 0.87$) and the scale items have a multivariate normal distribution ($X^2 = 3559.14$, $df = 190$, $p < .001$). In addition, the cross-correlations of the scale items in the anti-image matrix were examined and it was determined that the values ranging between 0.76 and 0.94 were of sufficient magnitude (>0.50) (Tabachnick & Fidell, 2015).

In order to determine the factor structure of the scale, principal axes analysis and promax rotation method, mainly preferred when sub-factors are related to each other, were used. Results indicate that the 10-factor structure in the original form of the scale showed an appropriate and strong distribution. In the 10-factor structure, where 64.33% of the total variance was explained, item distributions were similar to those in the original form and the pilot study. The sub-factors were named similarly to those in the original form. The factors to which the items in the scale belonged, the common variance of each item, and their correlations with the total score are shown in Table 2.

The goodness of fit values of the 10-factor structure obtained from the EFA of PCS-CV-SF with the data set obtained from a different sample were checked by CFA. The goodness of fit values

Table 2.
Factor Analysis Results of the Processes of Change Scale Cigarette Version Short Form

Factors and Items	Eigenvalues	Explained Variance (%)	Factor Loading	Communalities	Item – Total Correlations
<i>Factor 1. Consciousness raising</i>	1.08	5.37			
Item 4			0.64	0.62	0.56
Item 11			0.46	0.56	0.62
<i>Factor 2. Dramatic relief</i>	1.32	6.60			
Item 7			0.58	0.69	0.67
Item 18			0.76	0.77	0.55
<i>Factor 3. Environmental re-evaluation</i>	1.50	7.52			
Item 6			0.79	0.79	0.51
Item 12			0.77	0.72	0.51
<i>Factor 4. Self re-evaluation</i>	1.27	6.37			
Item 8			0.68	0.69	0.61
Item 15			0.57	0.50	0.46
<i>Factor 5. Social liberation</i>	1.09	5.43			
Item 3			0.64	0.49	0.38
Item 14			0.58	0.45	0.43
<i>Factor 6. Reinforcement management</i>	1.19	5.93			
Item 5			0.65	0.52	0.42
Item 20			0.64	0.61	0.53
<i>Factor 7. Counter conditioning</i>	1.22	6.12			
Item 1			0.46	0.64	0.69
Item 17			0.65	0.70	0.61
<i>Factor 8. Helping relationships</i>	1.23	6.14			
Item 10			0.63	0.47	0.32
Item 16			0.81	0.67	0.27
<i>Factor 9. Self liberation</i>	1.53	7.67			
Item 2			0.77	0.69	0.40
Item 13			0.81	0.78	0.49
<i>Factor 10. Stimulus control</i>	1.44	7.18			
Item 19			0.73	0.74	0.62
Item 9			0.64	0.78	0.71

Explained total variance of PCQ-SV = 64.33%.

determined with the CFA sample were $\chi^2/df = 1.60$ ($\chi^2 = 200.04$, $df = 125$, $p < .001$), GFI = 0.95, AGFI = 0.91, CFI = 0.97, RMSEA = 0.04, and SRMR = 0.03. The values obtained and the criteria of goodness of fit indices frequently used in the literature (Hu & Bentler, 1999) are presented in Table 3. Accordingly, it would not be unwise to claim that the model with 10 factors and 20 items obtained from the Turkish sample shows excellent fit with the data. The standardized coefficients showing the relationship between the items and their factors ranged between 0.64 and 0.92,

and all of them were significant at the 0.01 level. The factor loadings of the model are shown in Figure 1.

The original classification of the 10-factor structure of the scale, in which the first 5 factors are experiential (cognitive) processes and the last five sub-factors are behavioral processes, was also tested in the Turkish sample, and the results are presented in Table 4. The goodness of fit values found for the second-level factor structure tested on the CFA sample of the study were χ^2/df

Table 3.
Confirmatory Factor Analysis Results of Processes of Change Scale Cigarette Version Short Form

Fit Index	Excellent Fit	Acceptable Fit	Value in First Level Factor Analysis	Value in Second Level Factor Analysis
χ^2/SD	≤ 2	≤ 5	1.60	2.00
GFI	>0.90	>0.85	0.95	0.92
AGFI	>0.90	>0.80	0.91	0.89
CFI	>0.95	>0.90	0.97	0.94
RMSEA	≤ 0.05	≤ 0.08	0.04	0.05
SRMR	≤ 0.05	≤ 0.10	0.03	0.06

χ^2 = chi-square; AGFI, adjusted goodness-of-fit index; CFI, comparative fit index; GFI, goodness-of-fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual.

= 2.00 ($\chi^2 = 218.24$, $df = 159$, $p < .001$), GFI = 0.92, AGFI = 0.89, CFI = 0.94, RMSEA = 0.05, and SRMR = 0.06, respectively. The values obtained show that the data collected from the Turkish sample show a good fit for the model, including two main factors (Byrne, 2010; Hu & Bentler, 1999). The standardized coefficients showing the relationship between the items and their factors ranged between 0.28 and 0.92, and all of them were significant at the 0.01 level. The factor loadings of the model are shown in Figure 2.

Findings Regarding the Reliability of PCS-CV-SF

In order to test the reliability of the Turkish form of the PCS-CV-SF, Cronbach's α internal consistency coefficient and McDonald's ω values were calculated separately for EFA and CFA samples, and the results are summarized in Table 4. The internal consistency coefficient obtained for the whole scale

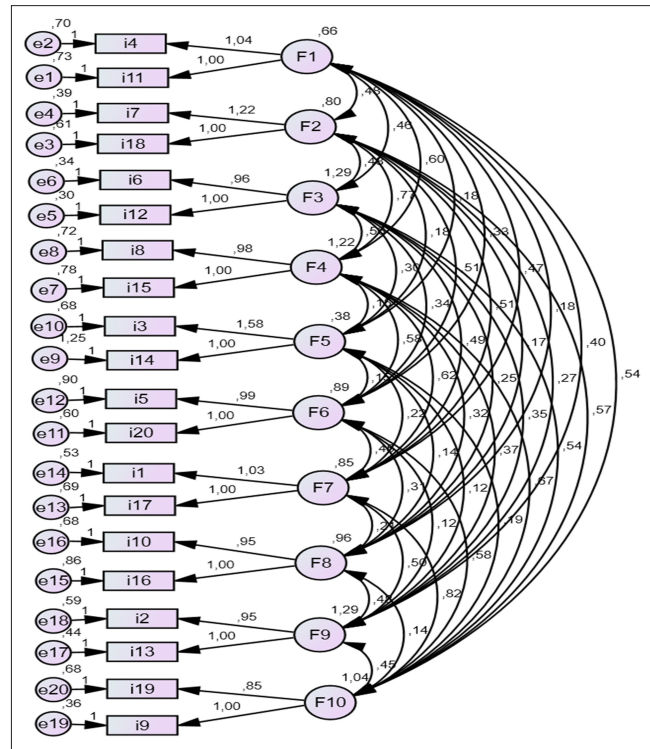


Figure 1. First Level Confirmatory Factor Analysis Diagram for the Main Study of the Processes of Change Scale Cigarette Version.

consisting of 20 items was $\alpha = 0.89$ in the EFA group and $\alpha = 0.88$ in the CFA group. The McDonald's ω coefficient was 0.90 in the EFA group and 0.89 in the CFA group. The α and ω coefficients calculated for the sub-factors were found to be at similar levels in the EFA and CFA groups with different samples. According to the analysis results in Table 4, the reliability coefficients obtained for the sub-factors ranged between 0.54 and 0.89.

Table 4.
Reliability Analysis Results of the PCS-CV-SF

Factor	Cronbach Alpha (α)		McDonald's Omega (ω)		Test – Re-test (r)
	EFA Sample	CFA Sample	EFA Sample	CFA Sample	
Consciousness raising	0.65	0.66	0.65	0.66	0.52
Dramatic relief	0.80	0.79	0.80	0.79	0.68
Environmental re-evaluation	0.84	0.89	0.84	0.89	0.64
Self re-evaluation	0.72	0.76	0.72	0.76	0.45
Social liberation	0.62	0.54	0.62	0.54	0.34
Reinforcement management	0.69	0.70	0.69	0.70	0.61
Counter conditioning	0.76	0.74	0.76	0.74	0.35
Helping relationships	0.70	0.70	0.70	0.71	0.78
Self liberation	0.83	0.83	0.83	0.83	0.54
Stimulus control	0.85	0.77	0.85	0.77	0.64
Cognitive processes	0.85	0.83	0.85	0.83	0.73
Experiential processes	0.82	0.80	0.83	0.81	0.75
Processes of change scale cigarette version short form total	0.89	0.88	0.90	0.89	0.75

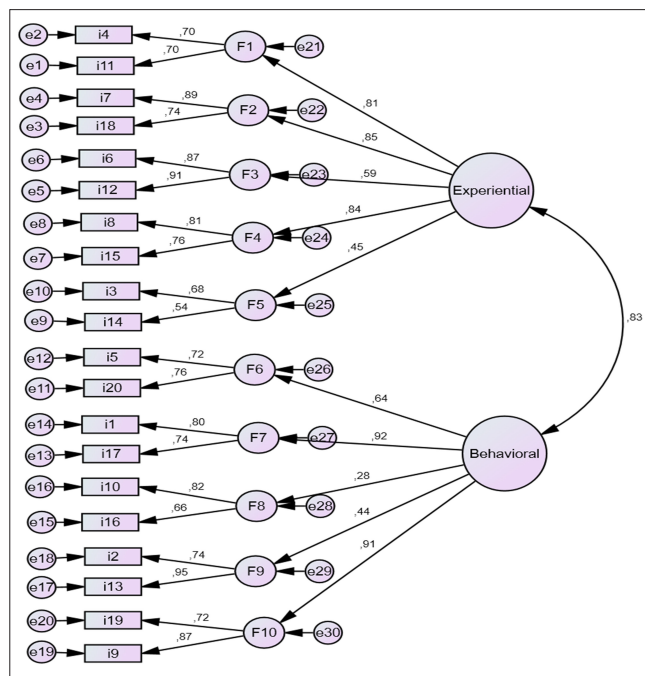


Figure 2. Second Level Confirmatory Factor Analysis Diagram for the Main Study of the Processes of Change Scale Cigarette Version.

Test – retest correlations were calculated in order to assess the scale's long-term consistency. For this purpose, the scale was administered to a group of 46 (19 female 41.3%, 27 male 58.7%) adult smokers or adults with previous smoking experience (age mean = 21.28 ± 2.33) at 3-week intervals, and the results were analyzed. The test – retest reliability coefficient of PCS-CV-SF was found to be high at 0.75. The correlations between the 3-week intervals calculated for the sub-factors were between 0.34 and 0.78. Accordingly, it can be said that the reliability of the PCS-CV-SF over time is at an acceptable level.

Discussion

In this study, the psychometric procedures necessary for the adaptation of the PCS-CV-SF, developed based on the transtheoretical model, to the Turkish population were carried out. Scale adaptation studies are frequently preferred in behavioral research. Scale adaptation studies are considered advantageous because a test with known psychometric properties is more reliable than a newly developed test, saves researchers time and money, and allows cross-cultural comparisons (Hambleton & Patsula, 1999).

One of the most crucial phases of scale adaptation studies is cultural adaptation, which involves the lengthy and difficult processes of translation (Hambleton, 1996). Every effort was made in this study to guarantee that the scale could be adapted in a way that would be beneficial and yield positive outcomes in future research. A pilot study was carried out to assess the validity and reliability of the scale following the language controls. The exploratory and CFA results obtained from the pilot sample generally revealed good agreement, and only minor linguistic revisions were made for the actual study.

The sampling adequacy was assessed using the KMO coefficient and Bartlett's test of sphericity in the EFA carried out

to test construct validity in the actual adaptation study of the PCS-CV-SF. These tests are measures of factorability; the KMO value should be higher than 0.60, and the significance level of Bartlett's test should be less than 0.05. (Brace et al., 2003). The values obtained in this study were found to be within the ranges specified in the literature. As a result of the EFA, it was determined that the 10-factor structure showed a one-to-one fit with the original form and explained 64.33% of the total variance. In behavioral sciences, a scale explaining at least 40% of the variance is deemed sufficient (Şencan, 2005). Accordingly, it can be assumed that the variance explained by the PCS-CV-SF is at a good level. In addition, the factor loadings obtained as a result of EFA were found to be between 0.46 and 0.81, and these values were found to have the factor power recommended in the extant literature (Tabachnick & Fidell, 2015). It can thus be suggested that the factor loadings in the EFA results of the long form of the PCS-CV are between 0.40 and 0.83 (Prochaska et al., 1988) and are similar to this study.

The goodness of fit values of the 10-factor structure obtained from the EFA of the PCS-CV-SF with the data set obtained from a different sample were checked with CFA. The original form of the scale also had a 10-factor structure. It would be fair to claim that the obtained goodness of fit values ($\chi^2/df = 1.90$, GFI = 0.95, AGFI = 0.91, CFI = 0.97, RMSEA = 0.05, and SRMR = 0.04) showed excellent fit according to the criteria determined in the related literature (Byrne, 2010; Hu & Bentler, 1999). A second-level CFA was conducted to determine whether the model, in which the 10-factor structure in the original form of the scale was grouped under two main dimensions, would be confirmed in the Turkish sample. Accordingly, the values obtained from the second-level CFA ($\chi^2/df = 2.00$, GFI = 0.92, AGFI = 0.89, CFI = 0.94, RMSEA = 0.05, and SRMR = 0.06) were within acceptable ranges and showed good fit with the Turkish sample. Furthermore, the goodness of fit indices obtained in this study are similar to the original long form of the scale developed by Prochaska et al. (1988). The GFI value found for the 10-factor structure in the original form was 0.88, and the GFI value found for the second-level analysis in which these 10 factors were grouped under two main factors was 0.89. In an adaptation study (Sarbandi et al., 2013) conducted with an Iranian sample, only first-level CFA was performed for construct validity and good fit results ($\chi^2/SD = 1.91$, GFI = 0.92, CFI = 0.91, RMSEA = 0.06) were obtained for the 10-factor structure. The values obtained from the Iranian sample of the scale are in line with those of this study. In another study (Hoeppner et al., 2006), in which the validity and reliability of the short form of the PCS-CV-SF was tested on adolescents, second-order factor analysis procedures were performed and goodness of fit values ($\chi^2/df = 6.06$, CFI = 0.92, RMSEA = 0.08) were found to be consistent with the values found in this study. Çelik (2014) adapted the Turkish version of the PCS-CV-SF for adolescents and conducted both first- and second-level confirmatory factor analyses in his study and obtained very good fit values similar to the results of this study.

The results of the factor analysis conducted in the pilot and main study provided evidence for the validity of the structure of the 20-item scale, which includes 10 sub-factors under two main factors, in the Turkish sample. As in its original form, the PCS-CV-SF consists of 10 sub-factors under the main dimension

of experiential processes: “mindfulness-consciousness raising,” “emotional arousal,” “dramatic relief,” “environmental re-evaluation,” and “social liberation” and under the main dimension of behavioral processes: “reinforcement management,” “counter-conditioning,” “helping relationships,” “self liberation,” and “stimulus control.”

The reliability of the PCS-CV-SF was analyzed with Cronbach's α and McDonald's ω coefficients, which are frequently preferred in multiple rating instruments (Yurdugül, 2006). Reliability analyses were calculated separately in EFA and CFA groups, which are different samples. In addition, test – retest correlations were examined to test the reliability of the test over time. Cronbach's internal consistency coefficient for the whole scale was 0.89 in the EFA group and 0.88 in the CFA group. McDonald's ω coefficient was found to be 0.90 in the EFA group and 0.89 in the CFA group. The reliability coefficients obtained for each sub-factor ranged between 0.54 and 0.89. Considering that the reliability level for measurement tools to be used in research is deemed 0.60 and above, these values are within acceptable limits (Büyüköztürk, 2002; Kalaycı, 2010). It was found that the reliability values of “Social Liberation,” one of the sub-factors in the scale, have the lowest values among the other sub-factors, with 0.54 and 0.60. This sub-factor was reported to be at a similarly low level in the original long form of the scale (Prochaska et al., 1988) and in the adaptation of the short form for adolescents (Hoepfner et al., 2006). Hoepfner et al. (2006) developed a short form to measure the processes of change in adolescents' smoking cessation processes, with sub-factor values ranging between 0.60 and 0.89. In the same form, the reliability coefficient of the “Social Liberation” sub-factor was found to be 0.60. Sarbandi et al. (2013) aimed to test the validity and reliability of the Persian version of the Processes of Change Scale Cigarette Version developed by Prochaska et al. (1988) and found the factor values of the sub-factors of the scale to be between 0.60 and 0.84. Çelik (2014) adapted the adolescent form of the scale to Turkish culture and found that the lowest coefficients were “Social Liberation” and “Emotional Arousal,” with 0.60 and 0.61. These results show that the scale yielded results in parallel with similar studies.

The test – retest reliability of the scale was conducted as a measure of the stability of the instrument. The test – retest reliability coefficient was found to be at a high level with 0.75. The correlations between the 3-week intervals calculated for the sub-dimensions were between 0.34 and 0.78. Although the original form of the scale does not have analysis results of the repetition of the test, the validity and reliability study of the scale conducted with the Malaysian sample (Yasin et al., 2011) showed test – retest correlations of 0.35 and 0.70, similar to this study. These findings suggest that the PCS-CV-SF adapted into Turkish can be used to measure adults' smoking behavior change. In this regard, it is thought that the findings obtained from the present study may be useful both for smokers and for those involved in tobacco cessation programs. The measurement tool obtained from this study can be used in designing smoking cessation intervention programs and scientific research on smoking in Türkiye, where smoking rates are quite high.

Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethics Committee Approval: This study was approved by the Ethics Committee of Trabzon University (Approval no.: E-81614018-000-2200011483, Date: 2022).

Informed Consent: Written informed consent was obtained from the participants who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – H. Y., F.A.K., M.K., A.K., C.T.; Design – H.Y., F.A.K., M.K., A.K., C.T.; Supervision – H.Y., F.A.K., M.K., A.K., C.T.; Data Collection and/or Processing – M.K., A.K., C.T., M.Ö., V.S.A., Z.Ş.; Analysis and/or Interpretation – F.A.K., Literature Search – Ö.G.O.; Writing – F.A.K., Ö.G.O.; Critical Review – H.Y.

Declaration of Interests: The authors have no conflict of interest to declare.

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ORIGINAL ARTICLE

Turkish Reliability and Validity of the Respiratory Symptom Experience Scale

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Main Points

- This is the first Turkish cross-culturally adapted scale designed to assess respiratory symptoms experienced by smokers.
- The four-item Turkish version of the Respiratory Symptom Experience Scale (RSES) demonstrates satisfactory reliability (α score = 0.753)
- The four-item Turkish version of the RSES may be useful in the early diagnosis of chronic obstructive pulmonary disease in smokers by raising awareness of respiratory symptoms.

Abstract

The objective of this study was to adapt the Respiratory Symptom Experience Scale for use in Turkish and to assess its reliability and validity among smokers. The study included 90 smokers aged 28 – 64 from Bitlis Province, with a mean age of 43.92 ± 7.82 , of whom 26.6% were women. Initially, the scale was translated forward and backward. The finalized version was then administered to participants in person. To determine the internal consistency and construct validity of the scale, internal consistency analysis, exploratory factor analysis, and confirmatory factor analysis were conducted. The Turkish version of the four-item Respiratory Symptom Experience Scale demonstrated adequate reliability with a Cronbach's α of 0.753. Test – retest reliability, assessed 1-week interval, further confirmed the scale's consistency. However, the third item was removed from the scale due to its negative impact on the goodness of fit index in the confirmatory factor analysis. The Turkish version of the four-item Respiratory Symptom Experience Scale is a reliable and valid instrument for assessing respiratory symptoms in smokers.

Keywords: Addiction, reliability, smoking, validity

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Introduction

Cigarette smoking is a highly addictive routine due to nicotine (El-Boraie & Tyndale, 2021) and poses a significant health concern (Sharma et al., 2021). Reflecting its highly addictive nature, over one billion individuals smoke worldwide (Centner et al., 2020). Globally, one in four men and one in twenty women smoke (Collaborators, 2017). In Türkiye, smoking rates are even higher, with approximately half of the men (46.1%) and nearly one-fifth of the women (15.7%) identified as smokers, resulting in one-third of the general population (30.5%) smoking (Özer et al., 2018).

Cigarettes, which contain thousands of chemicals and numerous carcinogenic substances (Hecht, 2003), provoke both acute and chronic inflammatory responses (Ji et al., 2021), leading to cardiovascular and cardiopulmonary diseases (Yayan et al., 2024). One significant consequence of smoking is chronic obstructive pulmonary disease (COPD), characterized by respiratory symptoms and airflow limitation (Vogelmeier et al., 2017). COPD is a major global health concern (Sharma et al., 2021) due to its widespread prevalence (~12%) (Adeloye et al., 2015), along with its associated morbidity (Yayan et al., 2024) and mortality (Murray & Lopez, 1997). The substantial global burden of COPD underscores



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the urgent need for effective prevention and treatment strategies (Lin et al., 2022).

Previously developed self-reported scales and questionnaires for COPD patients may be viewed as a response to this pressing need. These self-reported assessment tools are specifically designed and validated to assess respiratory symptoms experienced by COPD patients (Birring et al., 2003; Jones et al., 2009; Jones et al., 1991; van der Molen et al., 2003). However, these tools generally assess symptoms without distinguishing the underlying pathology of COPD development. Moreover, since COPD is predominantly diagnosed in individuals aged 40 and older (Labaki & Rosenberg, 2020) these tools may indirectly target a specific age range. Such limitations restrict the applicability of these assessment tools to smokers (Shiffman et al., 2023), who represent a primary risk group for COPD (Sharma et al., 2021) and exhibit a similar symptom cluster and similar prognosis with COPD (Yayan et al., 2024). The Respiratory Symptom Experience Scale (RSES) is an assessment tool specifically developed to address the need arising from this query (Shiffman et al., 2023).

Although the proportion of smokers is decreasing in most countries worldwide, the lack of significant reduction in countries within the eastern Mediterranean region, including Türkiye (Ruvuna & Sood, 2020), and the concerning high smoking rates in Türkiye (Özer et al., 2018) highlight the need to assess the respiratory symptoms experienced by smokers. This study aimed to perform the cross-cultural adaptation of the RSES in Turkish and assess its reliability and validity in smokers.

Material and Methods

This study was carried out in Bitlis Province between April 2024 and June 2024, with approval from the Ethics Committee of Bitlis Eren University (Approval no.2024 / 03-22 ; Date: 29 / 03 / 2024). The participants were recruited from the general population residing in the province of Bitlis. Individuals were reached using the snowball sampling method. Participants were verbally informed and provided written consent before enrollment. Authorization was also obtained from the author of the original scale. Sample size was determined in accordance with the number of items in the RSES, following the guideline of including five to ten participants per item (Terwee et al., 2007). The study targeted individuals aged 28 and older who had been smoking for at least 10 years. Exclusion criteria were having a first-degree relative currently or previously working in the tobacco industry, a household member engaged in legal action against a tobacco company, recent participation in tobacco-related research, or experiencing cold or flu-like symptoms in the past month (Shiffman et al., 2023). Out of 96 individuals assessed for eligibility, 90 were included. Six individuals were excluded for being under 28 years of age ($n = 1$) or having smoked for less than 10 years ($n = 5$). Sociodemographic and smoking-related information of the participants was also collected.

The RSES, developed by Shiffman et al. (2023), is a unidimensional tool designed to evaluate respiratory symptoms in smokers over the past month. This scale consists of five items, each addressing potential respiratory symptoms experienced by smokers, with responses captured on a five-point Likert scale. The overall score is derived by averaging the responses across all

items. If any item is left unanswered, the composite score is not calculated. The Turkish version consists of four items: “morning cough,” “cough frequently,” “easily winded,” and “wheezing.” Each item is scored on a scale from 1 to 5. The scores given by participants for each item are summed and then divided by four to calculate the composite score. Higher scores indicate a greater frequency of respiratory symptoms.

For the initial phase of cross-cultural adaptation and validation, two different translators translated the original scale from English into Turkish. To ensure equivalence between the two versions, both forward and backward translations were performed. The first draft of the Turkish version was then created based on these translations and subsequently evaluated by a Turkish language expert. An expert committee, composed of five physiotherapists holding Ph.D. degrees, reviewed the draft for semantic, idiomatic, experiential, and conceptual equivalence, as well as readability. Revisions were made until all experts reached consensus on the revised version of the scale. To enhance sentence structure, clarity, and fluency, the first, fourth, and fifth items were adjusted. The scale’s final version was established after experts reached a consensus on all aspects.

Following the development of the final version of the scale, its reliability was assessed through both internal consistency and the test – retest method. To evaluate test – retest reliability, the scale was administered to 50 smokers with a 1-week interval between assessments. Internal consistency was classified according to the previously determined criteria established by Koo and Li (2016).

The construct validity of the scale was assessed using both exploratory and confirmatory factor analyses, conducted on a sample of 90 smokers. Prior to these analyses, the Kaiser-Meyer-Olkin (KMO) test was performed, yielding a value of 0.755, which indicates good sample adequacy (Almeida et al., 2022). Additionally, the Bartlett’s test of sphericity produced a chi-square value of 91.13 ($df = 6$; $p < .001$), supporting the suitability of the data for factor analysis.

Statistical Analysis

Confirmatory factor analysis was conducted using SPSS Amos (IBM SPSS Corp.; Armonk, NY, USA). The factor structure of the RSES was identified through exploratory factor analysis, employing principal component analysis. Given the unidimensional nature of the scale, no rotation method was applied during the exploratory factor analysis. Internal consistency and the scale’s correlation were evaluated using Cronbach’s alpha coefficient and Pearson correlation analysis, respectively. The normality of the scale’s distribution was assessed through skewness and kurtosis values. The values obtained range from -0.622 – 0.891 . Additionally, it was evaluated visually using a histogram graph. The intra-class correlation coefficient analysis was used to assess test – retest reliability. The receiver operating characteristic (ROC) curve was used to determine appropriate cut-off values. Reliability was examined through both internal consistency analysis and the test – retest method. The significance threshold was set at $p < .05$.

Results

Nearly one-third of the participants were under the age of 40 (31.1%), and the average smoking duration among

Table 1.
Sociodemographic Characteristics of the Participants

		<i>n</i>	%
Age (years)	<40	28	31.1
	40 – 49	41	45.6
	≥50	21	23.3
Average age (years) = 43.92, standard deviation = 7.82			
Gender	Male	67	74.4
	Female	23	25.6
Marital status	Single	17	18.9
	Married	73	81.1
Educational background	Primary/secondary school degree	16	17.8
	High school degree	29	32.2
	Associate degree	11	12.2
	Bachelor's degree	24	26.7
	Postgraduate degree	10	11.1
Income status (₺)	≤30 000	26	28.9
	30 000 – 40 000	39	43.3
	>40 000	25	27.8
Average income (₺) = 36.730, standard deviation = 14.072			
Working status	Not working	4	4.4
	Working	86	95.6

Note: ₺ = Turkish lira.

individuals was over 20 years (23.94 ± 9.15 years). More than three-quarters of the participants were married (81.1%), and the majority were male (74.4%). The average income of the participants was more than twice the minimum wage. Half of the participants held an associate degree or higher, and nearly all (95.6%) were employed (Table 1).

Cigarettes were the most frequently used tobacco product among the participants, with 66.7% reporting cigarette consumption. More than half of the participants (64.4%) were considering quitting smoking, while nearly half (44.4%) had made concrete attempts to quit. Nearly one-fifth of the participants had a

chronic illness (17.8%, $n = 16$). The most common chronic illness was COPD (6.7%, $n = 6$), followed by chronic bronchitis (5.6%, $n = 5$), asthma (5.6%, $n = 5$) and allergies (5.6%, $n = 5$), each with similar prevalence. The composite RSES score of the participants was 1.83 ± 0.90 . There was a statistically significant variation in RSES scores associated with the presence of chronic disease (Table 2).

The internal consistency of the five-item RSES was also deemed adequate, with a Cronbach's α of 0.796. However, the third item was removed from the scale because it negatively impacted the goodness of fit (GOF) index in the confirmatory factor analysis. After removing this item, the internal consistency was recalculated and remained satisfactory, with a Cronbach's α of 0.753. Respiratory symptom experience scale's reliability was assessed using both test – retest and internal consistency methods. The test – retest reliability was evaluated with 50 smokers over a 1-week interval, resulting in a satisfactory reliability coefficient. The test – retest reliability analysis for the Turkish version of the revised scale demonstrated high consistency across measurements. The intra-class correlation coefficient was found to be 0.924 (CI: 0.866 – 0.955) for single measures and 0.961 (CI: 0.928 – 0.977) for average measures, both with a 95% CI. The F value was 27.843, and the p value was less than .001, indicating high reliability for the measurements of the Turkish version of the scale. In the Turkish version of the scale, the lowest item – total correlation coefficient was found to be 0.717, and the highest was 0.805.

The ROC analysis for the Turkish version of the scale yielded an area under the curve of 0.796, indicating good diagnostic performance ($p < .001$). A score of 1.625 was identified as the optimal cut-point for assessing self-reported respiratory symptom-relevant diagnosis among smokers, with a specificity of 69.7% and sensitivity of 78.6%.

To assess data suitability before factor analyses, we conducted the KMO test and Bartlett's test of sphericity. The KMO value was 0.755, indicating good sample adequacy. Bartlett's test of sphericity yielded a chi-square value of 91.13 ($df = 6$; $p < .001$), confirming that the data were appropriate for factor analysis. The original five-item RSES explained 56.7% of the variance. After the removal of the third item, the explained variance increased to 59.36%. The exploratory factor analysis revealed

Table 2.
Comparison of Participants' Characteristics Related to Smoking, Chronic Disease Status and RSES Scores

		<i>n</i>	%	<i>t</i>	<i>p</i>	CI	
Tobacco product consumed	Cigarette	60	66.7	0.835	.406	–0.234	0.574
	Tobacco	30	33.3				
Considering quitting smoking	Yes	58	64.4	0.515	.608	–0.502	0.295
	No	32	35.6				
Previous attempt to quit smoking	Yes	40	44.4	0.48	.632	–0.291	0.477
	No	50	56.6				
Presence of chronic disease	Yes	16	17.8	3.14	.002*	–1.224	–0.275
	No	74	82.2				

* $p < .05$ statistical significance, independent samples t -test.

Table 3.
Explanatory Factor Analysis Results of the RSES

Items	Factor Load (Five Item)	Factor Load (Four Item)
Morning cough	0.663	0.728
Cough frequently	0.781	0.823
Shortness of breath	0.758	–
Easily winded	0.767	0.708
Wheezing	0.788	0.816

that the factor loadings for the Turkish version of the RSES varied between 0.708 and 0.823 (Table 3).

As previously mentioned, the third item was removed due to its adverse effect on the GOF values. The final confirmatory factor analysis results are illustrated in Figure 1. The GOF values for the confirmatory factor analysis, which fall within the recommended range, are detailed in Table 4.

Discussion

The results of this study revealed that the four-item RSES in Turkish demonstrates both reliability and validity as a tool for assessing respiratory symptoms in smokers.

Smokers and COPD patients share a similar prognosis and same respiratory symptom cluster (Yayan et al., 2024), which is expected given that smoking is the primary cause of COPD (Sharma et al., 2021). However, the recognition of the importance of risk factors other than smoking in the development of COPD over the past decade along with the fact that these factors contribute to COPD development in approximately half of the COPD patients (Pyszora & Lewko, 2022), has called this traditional view into question. The questioning of this traditional view has

similarly paved the way for the assessment tools used to assess respiratory symptoms experienced by both groups to be called into question as well (Shiffman et al., 2023). Existing assessment tools, specifically validated for COPD patients (Birring et al., 2003; Jones et al., 2009; Jones et al., 1991; van der Molen et al., 2003) and COPD is mostly diagnosed in individuals aged 40 and over (Labaki & Rosenberg, 2020), making them less applicable to smokers. The RSES is an assessment tool specifically developed to meet this need (Shiffman et al., 2023).

The reliability and validity of the original scale were evaluated online with smokers ($n = 202$), former smokers ($n = 200$), and e-cigarette users who had switched from smoking ($n = 208$). The scale was reported to be a reliable and valid instrument for assessing respiratory symptoms in these populations, with both reliability and test – retest scores found to be satisfactory (>0.80). The variance explained by the original scale was 62.7% (Shiffman et al., 2023).

Similar to the original scale, the reliability of the Turkish version of the four-item RSES was satisfactory ($\alpha = 0.753$). The third item was removed due to its negative impact on the GOF and its similarity in content to the fourth item. Following this removal, an improvement was observed in the goodness of fit indices of the confirmatory factor analysis, including AGFI, SRMR, GFI, CFI, NFI, and TLI, and these indices remained at a good level. Although RMSEA did not provide a good fit, it achieved an acceptable level of fit, and the explained variance increased to 59.36%. This level of explained variance is considered acceptable for unidimensional scales, as values between 40% and 60% are deemed appropriate (Hair et al., 2019). In the Turkish version of the scale, the lowest item – total correlation coefficient was found to be 0.717, and the highest was 0.805. It is recommended that the scores for each item correlate with the total scale score, with correlation values exceeding 0.30. (Shields et al., 1989).

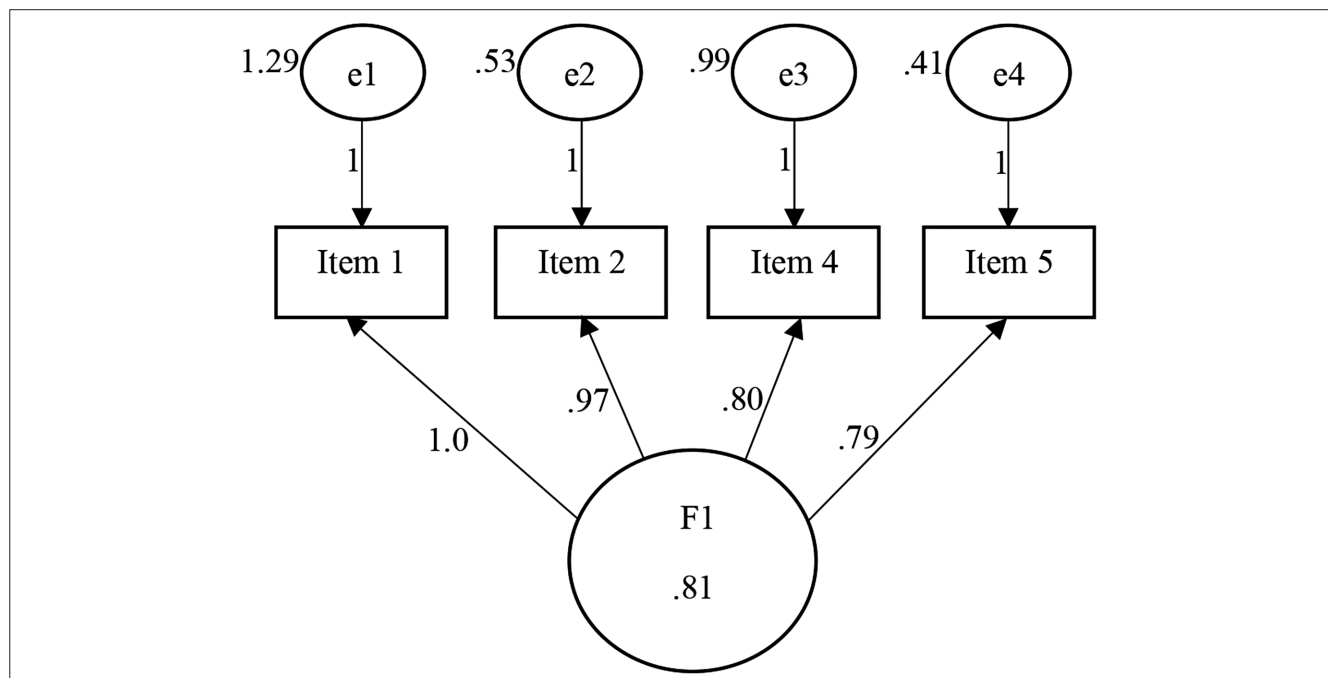


Figure 1. Confirmatory Factor Analysis Graph.

Table 4.
Goodness of Fit Indexes of the Confirmatory Factor Analysis

	AGFI	GFI	CFI	NFI	TLI	RMSEA	SRMR	CMIN/DF
Recommended range	>0.85	>0.80	>0.90	>0.90	>0.90	<0.08	<0.08	–
	0.919	0.984	0.991	0.970	0.972	0.068	0.032	1.413

Note: AGFI = adjustment goodness of fit index; CFI = comparative fit index; CMIN/DF = Chi-square minimum discrepancy function by degrees of freedom; GFI = goodness of fit index; NFI = normal fit index; TLI = non-normed fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.

Our study differs from that of Shiffman et al. (2023) in terms of the population for which the scale's reliability and validity were assessed. While Shiffman et al. (2023) included smokers, former smokers, and individuals who had transitioned from smoking to e-cigarettes use, our study focused exclusively on smokers. This distinction may be attributed to the legal measures in Türkiye that restrict e-cigarette use and the challenges associated with smoking cessation. The lack of legislative regulations concerning e-cigarette use in the United States has resulted in increased use, particularly among young people (Bozier et al., 2020). In Türkiye, legal regulations preventing the spread of e-cigarettes have curtailed e-cigarettes' commercialization and widespread use (Glantz, 2023). Another determining factor is the difficulty in smoking cessation, characterized in our study by the unsuccessful smoking cessation attempts in nearly half of the smokers (44.4%). The very low success rate of smokers who wish to quit (3%) (Principe et al., 2024) helps explain the challenges faced by smokers included in our study.

Although our study differs from that of Shiffman et al. (2023) in terms of population included, it is noteworthy that we achieved similar reliability and test-retest scores to those of the original scale. We attribute these comparable results to the fact that e-cigarette use has a similar effect on the respiratory system as smoking (Münzel et al., 2020) and that the inflammatory effects of smoking on the respiratory system can persist even after smoking cessation (Louhelainen et al., 2009).

The composite scale score for smokers in our study ($1.83 \pm .90$) was lower than the score reported by Shiffman et al. (2023) (2.09 ± 0.06). This difference may be attributed to variations in the study populations. Factors such as the duration of smoking and the presence of COPD or its subtypes might account for this variability. Shiffman et al. (2023) reported a significantly higher average smoking duration (41.19 ± 11.7 years) compared to our study (23.94 ± 9.15 years). Additionally, while nearly a quarter of smokers (21.3%) in the study of Shiffman et al. (2023) had COPD or its subtypes, the prevalence of COPD or its subtypes in our study was 12.3%. The linear relationship between smoking duration and respiratory symptoms (Liu et al., 2015), along with the common occurrence of respiratory symptoms among COPD patients (Labaki & Rosenberg, 2020), supports this observation.

The study has some limitations. Due to low rate of successful smoking cessation and legal restrictions on the commercializing of e-cigarettes, former smokers and e-cigarette users were not included in the study. Consequently, changes in respiratory symptoms after smoking cessation could not be evaluated. Although the study was conducted on individuals within a nearly similar age range to the original scale study, the lack of a more specific

age range tailored to chronic conditions, particularly COPD, constitutes another limitation of the study.

In conclusion, the Turkish version of the RSES is a reliable and valid instrument for evaluating respiratory symptoms in smokers.

Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethics Committee Approval: This study was approved by the Ethics Committee of Bitlis Eren University (Approval no.2024 / 03-22 ; Date: 29 / 03 / 2024).

Informed Consent: Written informed consent was obtained from the participants who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

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Appendices

The Turkish version of the four-item Respiratory Symptom Experience Scale is given in the table blow.

Solunum Semptom Deneyim Ölçeği Türkçe Versiyonu

Aşağıdaki sorular için lütfen son 30 gün içindeki deneyimlerinizi düşünün.	Hiçbir zaman (Son 30 gün içinde 0 gün)	Nadiren (1 – 5 gün)	Bazen (6 – 15 gün)	Çoğu günler (16 – 29 gün)	Her gün (Son 30 gün içindeki her gün)
1 SABAH ÖKSÜRÜĞÜ Sabah öksürüğüne eşlik eden balgam veya mukus					
2 SIK SIK ÖKSÜRME Gün içerisinde sık sık öksürme					
3 ÇABUCAK NEFESSİZ KALMA Normal günlük aktiviteler sırasında (örneğin çamaşır sepetini makineye taşıırken ve alışveriş yaparken) çabucak nefessiz kalma					
4 HIRILTI LI SOLUNUM Egzersiz veya fiziksel olarak yorucu diğer günlük aktiviteleri yapmadığınız zamanlarda (örneğin dinlenirken) göğsünüzden hırıltı veya ıslık sesinin gelmesi					

Hiçbir zaman (son 30 gün içinde 0 gün), nadiren (1 – 5 gün), bazen (6 – 15 gün), çoğu günler (16 – 29 gün), her gün (son 30 gün içindeki her gün)

ORIGINAL ARTICLE

Alcohol Use in First Responders in South Africa: Psychological Distress Factors Related to Harmful Drinking and Alcohol Dependence

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Main Points

- Higher levels of alcohol use were associated with higher levels of psychological distress.
- Anxiety, depersonalization, fatigue, and insomnia were significant predictors of alcohol use.
- Participants who were classified as being at risk for harmful alcohol use reported higher levels of psychological distress than those who were not.
- Participants classified as having alcohol dependence reported higher levels of distress than those who were not.

Abstract

First responders are frequently exposed to traumatic events and highly stressful situations due to the nature of their work. This enhances their vulnerability to psychological distress and the use of maladaptive strategies to cope. In South Africa, few studies have explored the relationship between alcohol use and mental health indicators among first responders. This study investigated the association between harmful drinking behaviors and post-traumatic stress disorder, depression, anxiety, emotional exhaustion, depersonalization, fatigue, and insomnia. A cross-sectional study was conducted with 429 first responders. The participants completed the Alcohol Use Identification Test, Patient Health Questionnaire-9, Generalized Anxiety Disorder Scale-7, Post-traumatic Stress Disorder Checklist for DSM-5, Maslach Burnout Inventory, Life Events Checklist, Chalder Fatigue Questionnaire, and Insomnia Severity Index. Higher levels of alcohol use were associated with higher levels of psychological distress. Specifically, anxiety, depersonalization, fatigue, and insomnia emerged as significant predictors of alcohol consumption. Participants classified as at risk for harmful alcohol use reported higher levels of psychological distress than those not at risk. Additionally, participants identified as having alcohol dependence reported higher levels of distress across all indicators than did those without alcohol dependence. These results underscore the need for integrated interventions that address both psychological distress and harmful drinking behaviors.

Keywords: Addictions to alcohol, harmful alcohol use, psychological distress

Introduction

The term *first responder* refers to members of professional organizations who respond to emergency situations, such as police officers, paramedics, firefighters, and search and rescue personnel. Owing to the nature of their work, first responders are routinely exposed to highly stressful and potentially traumatic situations at a frequency that far exceeds that of other occupational groups (Bonumwezi

et al., 2022). First responders often face critical incidents that involve directly experiencing or witnessing severe injuries, being threatened with or encountering weapons, and frequently witnessing death, sometimes in violent or tragic circumstances (Gryshchuk et al., 2022). The cumulative impact of such exposure can compromise their mental well-being, placing them at a greater risk of long-term psychological difficulties than those in other professions (Irizar et al., 2021).

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Burnout is a consequence of exposure to chronic stress in the workplace and it is characterized by emotional exhaustion, increased detachment or cynicism toward one's work, and a reduced sense of professional efficacy (Maslach and Jackson, 1981). Burnout tends to manifest as a constant state of anxiety and worry, with feelings of tension and hypervigilance (Reardon et al., 2020). Depressive symptoms often arise as a consequence of reduced feelings of personal accomplishment, persistent fatigue, and feelings of hopelessness. Jones and colleagues investigated the prevalence and correlates of psychiatric symptoms among first responders in the United States and reported that anxiety, depression, post-traumatic stress symptomology, harmful/hazardous alcohol use, sleep disturbances, and suicidality were salient concerns (Jones et al., 2018).

In their meta-analytic study of first responder mental health, Huang and colleagues identified significant levels of anxiety, depression, and stress among this population group (Huang et al., 2022). Paramedics and emergency medical service personnel demonstrated heightened levels of depression and anxiety compared to police officers, potentially because of their increased exposure to COVID-19 patients. In a study investigating suicidality among first responders in the United States, Bond and Anestis (2023) reported more lifetime suicidal ideation and dispositional capacity among this population than among those in other occupations.

Previous research suggests that stressors specific to work-related duties and tasks of first responders can lead to moral injury, defined as learning about, bearing witness to, or perceiving a failure to prevent acts that transgress moral beliefs, which can result in intense feelings of guilt, shame, anger, or contempt (Knobloch and Owens, 2024). This can increase vulnerability to suicidal ideation and behavior, depression, post-traumatic stress disorder (PTSD), and substance and alcohol use disorders (Lentz et al., 2021; Norman et al., 2022). Using a nationally representative sample of combat veterans in the United States, Norman and colleagues found that exposure to potentially morally injurious events (i.e., perpetration or witnessing of these events) was associated with increased vulnerability to substance use and alcohol use disorders (Norman et al., 2022).

In the literature, harmful alcohol use among first responders has been identified as a common mental health concern (Karnick et al., 2022; Kaufman et al., 2024; Levitt et al., 2024). First responders have higher levels of hazardous alcohol use compared to high-risk professions (Bartlett et al., 2019; Irizar et al., 2021). Hazardous alcohol use refers to alcohol consumption that is likely to increase the risk of adverse health outcomes in the future, whereas harmful alcohol use entails alcohol intake, which causes more immediate health problems (Irizar et al., 2021). Existing studies have ascribed the hazardous and harmful consumption of alcohol among first responders to the psychological distress that arises from consistent and repeated exposure to traumatic events in the context of their work (Bartlett et al., 2019; Kaufman et al., 2024; Zegel et al., 2019). This can lead to increased levels of anxiety, depression, PTSD, and burnout (Castillo-Carniglia et al., 2019).

The self-medication hypothesis and approach/avoidance bifurcation model are empirically established conceptual frameworks

that have been used to understand alcohol use among first responders (Arble and Arnetz, 2017; Khantzian, 1997). Both models propose that alcohol use represents an avoidant coping strategy. Alcohol can dampen intense emotions that arise from exposure to occupational stressors and provide temporary relief from post-traumatic stress symptomology, anxiety, and feelings arising from moral injury (e.g., shame, guilt, and regret). This negative reinforcement can increase alcohol use for coping and lead to dependency (Hawn et al., 2020; Khantzian, 1997). The approach/avoidance bifurcation model also proposes that the pleasurable effects of alcohol reinforce its use. Hence, this model highlights both the approach (desiring the pleasurable effects of alcohol) and avoidance components underlying alcohol use (Arble and Arnetz, 2017).

The current study was undertaken in South Africa, and previous research on this population group has been limited by small sample sizes, qualitative approaches, or assessment of only a narrow range of indicators. Some studies have focused solely on protective factors, such as coping styles, resilience, and mindset, without examining indices of psychological distress. For example, Wassermann and colleagues assessed coping styles among police officers ($n = 120$) in response to occupational stress and reported that these first responders predominantly used problem-solving, positive reappraisal, and confrontive coping to deal with their daily stress (Wassermann et al., 2019). A cross-sectional study of ambulance personnel ($n = 388$) identified PTSD as a salient mental health concern and found that a significant proportion of the sample exhibited symptoms consistent with this disorder. Those with PTSD are also significantly more likely to engage in smoking, illicit drug use, and problematic drinking (Ntatamala and Adams, 2022). A qualitative study involving eight homicide detectives from the South African Police Services identified exposure to homicide scenes involving women or children as a significant source of occupational stress. This exposure precipitated emotional distress among the first responders, which reportedly manifested as flashbacks, insomnia, irritability, and a lower threshold for aggressive behavior (Sibisi et al., 2022).

This study expands the existing knowledge base by investigating alcohol use among a sample of South African first responders. The current study examines the association of PTSD, depression, anxiety, burnout (measured through the subscales of emotional exhaustion and depersonalization), fatigue, and insomnia with harmful drinking behaviors. To the best of our knowledge, this is the first study to investigate alcohol use and its association with various indices of distress among South African first responders, specifically, police officers and paramedics.

Material and Methods

Participants and Procedure

This study used a cross-sectional survey design and convenience sampling. Police officers and paramedics actively employed in the Western Cape Province were invited to participate in the study. No exclusion criteria were applied. To capture a broad spectrum of experiences, participants were recruited from multiple police stations and healthcare facilities across urban and peri-urban areas.

The sample comprised of 429 first responders from the Western Cape Province of South Africa, including 309 police officers and 120 paramedics. Power analysis with G*Power indicated that $n = 160$ was sufficient to detect a medium effect size ($\alpha = 0.05$, $1-\beta = 0.95$) in a multiple regression with eight predictors. Most participants were men (55%) and the majority worked in an urban setting (92.3%). The average age of the participants was 39 (SD = 9.93) years. The average duration of service as a first responder was 13.24 years (SD = 9.65). The questionnaires were converted into an electronic format using Google Forms. First responders were recruited through three methods: the survey link was emailed to police stations and local hospitals; research assistants visited these locations in person to invite participation; and, with permission from administrators, the survey link and invitation were posted on Facebook groups dedicated to first responders. The online survey was designed to allow only one submission per participant. Data was collected from June 2023 to August 2024.

Instruments

Participants completed a demographic survey that included items pertaining to age, gender, duration of service, and work setting (e.g., urban or rural). In addition, participants completed the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993), Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001), Generalized Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006), Post-traumatic Stress Disorder Checklist for DSM-5 (PCL-5; Blevins et al., 2015), Maslach Burnout Inventory (MBI; Maslach & Jackson, 1981), Life Events Checklist (LEC; Blevins et al., 2015), Chalder Fatigue Questionnaire (CFQ; Jackson, 2015), and Insomnia Severity Index (ISI; Morin, 1993). Respondents took approximately 20 – 30 minutes to complete the survey.

The AUDIT is a 10-item self-report questionnaire developed by the World Health Organization to screen for hazardous and harmful patterns of alcohol consumption and potential alcohol dependence. Each item is scored on a scale of 0 – 4, with a total score ranging from 0 to 40. Higher scores indicate a greater risk of harmful alcohol use. A sample item from the AUDIT is “How often do you have six or more drinks on one occasion?”, with response options ranging from *never* to *daily or almost daily*. The AUDIT has been used in South Africa and has been demonstrated to have satisfactory reliability among a sample of HIV test seekers ($\alpha = 0.89$) (Saal et al., 2020) and a sample of university students ($\alpha = 0.75$; Pengpid et al., 2013).

The PHQ-9 is a 9-item instrument used to screen, diagnose, and measure the severity of depression. Responses to the nine items are made on a 4-point scale ranging from 0 (*not at all*) to 3 (*nearly every day*). An example of an item of the PHQ-9 is, “Over the last two weeks, how often have you been bothered by feeling down, depressed, or hopeless?” The authors of the PHQ-9 reported satisfactory reliability coefficients for a sample of primary care ($\alpha = 0.89$) and gynecology patients ($\alpha = 0.89$; Kroenke et al., 2001). The PHQ-9 has been extensively used in South Africa, with one study reporting a reliability coefficient of 0.76 for the PHQ-9 in a sample of primary healthcare patients (Bhana et al., 2015).

The GAD-7 is a 7-item scale used to screen for anxiety or measure its severity. It is scored on a 4-point scale that ranges from 0 (*not at all*) to 3 (*nearly every day*). An example of an item of the GAD-7 is, “Over the last two weeks, how often have you been

bothered by feeling afraid, as if something awful might happen?” Spitzer and colleagues (2006) reported a Cronbach’s α coefficient of 0.92 for the GAD-7 in a sample of primary care patients and provided evidence of criterion, construct, and factorial validity. In South Africa, Henn and Morgan (2019) reported reliability coefficients of 0.91 and 0.93 in different nonclinical samples.

The PCL-5 is a 20-item instrument that assesses DSM-5 symptoms of PTSD. Responses to the 20 items are made on a 5-point scale ranging from 0 (*not at all*) to 4 (*extremely*). An example of an item of the PCL-5 is “How much were you bothered by having strong negative feelings such as fear, horror, anger, guilt, or shame?” The developer of the instrument reported reliability coefficients of 0.94 and 0.95 for two different student samples (Blevins et al., 2015). In South Africa, Padmanabhanunni and Pretorius (2024) reported similar reliability coefficients (α and $\omega = 0.94$) for a sample of university students.

The MBI assesses three components of burnout: emotional exhaustion, depersonalization, and personal accomplishment. Only emotional exhaustion (nine items) and depersonalization (five items) were used in the current study. Emotional exhaustion refers to feelings of being emotionally worn out and drained as a result of stress in one’s personal or work life. An example item of emotional exhaustion is “I feel used up at the end of the workday.” Depersonalization refers to feelings of indifference toward members of the public and colleagues and can also include a sense of cynicism. An example of an item from the depersonalization scale is “I don’t really care what happens to some of the people I serve.” The MBI is scored on a 7-point scale that ranges from 0 (*never*) to 6 (*every day*). In the original development study, the authors of the MBI provided estimates of internal consistency of 0.89 for emotional exhaustion and 0.77 for depersonalization (Maslach and Jackson, 1981). In South Africa, the MBI was used with a sample of schoolteachers, and reliability coefficients (α and ω) of 0.94 and 0.86 were reported for emotional exhaustion and depersonalization, respectively (Padmanabhanunni and Pretorius, 2023).

The LEC-5 is a 16-item self-report measure designed to screen for potentially traumatic events that a person might have experienced, witnessed, or learned about happening to someone else. An example of an item of the LEC-5 is “Assault with a weapon.” One way to score the LEC-5 is to code it as “happened to me” (i.e., experienced) and “did not happen to me,” which would lead to an LEC-5 score ranging between 0 and 17. A weighted score was developed based on the potential greater traumatization from experienced events while still considering all exposures (Weis et al., 2022). Events experienced directly were weighted by three, events witnessed or that were part of their job were weighted by two, and events learned about were weighted by one. The total weighted scores range from 0 to 51, with higher scores indicating exposure to more traumatic events. Using the weighted scoring method, Weis and colleagues (2022) reported a reliability coefficient of 0.83 for the LEC-5. In South Africa, a study on university students reported a reliability coefficient of 0.93 for the LEC-5 (Padmanabhanunni and Wiid, 2022).

The CFQ is an 11-item measure of the extent and severity of fatigue in both clinical and nonclinical populations. The CFQ uses a 4-point scale ranging from 0 (*less than usual*) to 3 (*much*

more than usual). An example of an item of the CFQ is, “Do you need to rest more?” Scores on the CFQ range from 0 to 33, with higher scores indicating higher levels of fatigue. Chalder and colleagues reported a Cronbach’s α of 0.89 for the scale. A South African study reported a reliability coefficient of 0.83 for a sample of HIV-infected adolescents (Coetzee et al., 2018).

The ISI is a 7-item brief self-report measure of insomnia. Insomnia is a sleep disorder characterized by difficulty falling or staying asleep (Morin, 1993). Participants respond on a 5-point scale ranging from 0 (*none or not at all*) to 4 (*very or very much*). A sample item of the ISI is “How worried/distressed are you about your current sleep problems?” Scores on the ISI range from 0 to 28, with higher scores indicating more acute insomnia symptoms. The authors of the scale reported a reliability coefficient of 0.74 and 0.78 in two different samples of insomnia patients (Bastien et al., 2001). The ISI has also been used in South Africa (e.g., Lewis et al., 2021; Rossouw et al., 2024), but there are no reports on its reliability when used with South African samples.

Ethics

The study was conducted in accordance with the guidelines of the Declaration of Helsinki and approved by the Humanities and Social Sciences Research Ethics Committee of the University of the Western Cape (ethics reference: HS23/2/4, May 23, 2023) and the South African Police Services (ethics reference: 3/34/2, 27 June 2023). Additionally, the authors received approval to access hospitals from the Western Cape Department of Health (reference: WC_202307_041, 15 September 2023) and a private ambulance company to approach their employees (reference: December 12, 2023). No incentives were offered for participation.

Participants provided informed consent on the first page of the electronic questionnaire. No identifying particulars were collected, and participants were informed that they could withdraw at any time.

Data Analysis

All analyses were conducted using IBM SPSS for Windows, version 29 (IBM SPSS Corp.; Armonk, NY, USA). There were no missing values, as participants could not proceed to the next page of the questionnaire unless all items on the current page had been responded to. The analysis included the intercorrelations between study variables (Pearson’s r) and descriptive statistics (means, standard deviations, and estimates of internal consistency [α and ω] for all scales). For correlation analyses using Pearson’s r , the strength of relationships was classified as small for values around 0.10, medium for values around 0.30, and large for values around 0.50 (Lovakov and Agadullina, 2021).

Linear regression was used to identify significant predictors of alcohol use, with alcohol use as the dependent variable and indices of psychological distress as independent variables. Multivariate analysis of variance (MANOVA) was used to compare participants who were at risk of harmful drinking with those who were not at risk, as well as those who might be classified as alcohol dependent with those who were not classified as such. For MANOVA, effect sizes were classified as small for values around 0.01, medium for values around 0.06, and large for values around 0.14. These thresholds provide a framework for understanding

the proportion of variance in the dependent variables explained by the independent variables (Dobler et al., 2020).

A score of ≥ 8 on the AUDIT inventory is associated with harmful drinking, while a score of ≥ 13 in women and ≥ 15 in men is indicative of alcohol dependence (Saunders et al., 1993). In the MANOVA, the overall difference between the two groups was assessed using Hotelling’s T^2 and the difference in terms of individual variables was assessed using the F test. The effect size used in the MANOVA was partial eta squared (η_p^2).

Results

Table 1 presents the intercorrelations between the variables, descriptive statistics, and internal consistency estimates.

Table 1 shows that all the instruments demonstrated satisfactory reliability (α and $\omega = 0.87$ to 0.95). Alcohol use, as measured by AUDIT, was significantly positively related to all distress variables. Except for the relationship between alcohol use and traumatic events (LEC-5) and fatigue (CFQ), which may be regarded as having a small effect size, all other observed relationships can be described as having a medium effect size. These positive relationships indicate that higher levels of alcohol use are associated with higher levels of psychological distress.

The results of the linear regression are reported in Table 2.

Table 2 indicates that, while the zero-order correlations between alcohol use and indices of psychological distress were significant in all instances, only anxiety, depersonalization, fatigue, and insomnia emerged as significant predictors in the linear regression when all indices of psychological distress were examined together as predictors of alcohol use.

The results of the MANOVA comparing harmful and nonharmful alcohol use are reported in Table 3.

Table 3 indicates that there were significant differences between participants who were at risk of alcohol abuse and those who were not in terms of all the indices. In all instances, those at risk of harmful alcohol use reported higher levels of distress than those who were not classified as such. The partial eta squared indicated that most variables had a medium effect size, but exposure to traumatic events and fatigue had a small effect size.

The results of MANOVA comparing alcohol dependence and non-alcohol dependence are presented in Table 4.

Table 4 indicates that there were significant differences between participants who might be classified as having alcohol dependence and those who were not classified as such in terms of all indices, except exposure to traumatic events. In all instances, those classified as alcohol dependent reported higher levels of distress than those who were not classified as alcohol dependent. The effect sizes for most of the variables may be considered medium; however, in the case of fatigue, they can be considered small.

Discussion

This study investigated the association between indices of psychological distress and harmful drinking behaviors in a sample of South African first responders. There were several significant

Table 1.
Intercorrelations Between Variables, Descriptive Statistics, and Reliabilities

Scale	1	2	3	4	5	6	7	8	9
1. AUDIT									
2. PHQ-9	0.30**								
3. GAD-7	0.35**	0.73**							
4. PCL-5	0.35**	0.59**	0.66**						
5. EE	0.34**	0.56**	0.55**	0.63**					
6. DP	0.35**	0.46**	0.49**	0.56**	0.80**				
7. LEC-5	0.13*	0.21**	0.24**	0.23**	0.16*	0.16*			
8. CFQ	0.20**	0.49**	0.50**	0.49**	0.57**	0.50**	0.20**		
9. ISI	0.30**	0.52**	0.49**	0.51**	0.55**	0.47**	0.15*	0.61**	
Mean	9.5	7.7	31.2	24.9	12.5	23.8	14.4	8.90	10.9
SD	6.4	5.9	17.0	12.6	7.9	9.3	6.8	10.0	5.8
Alpha	0.94	0.89	0.92	0.95	0.90	0.84	0.88	0.89	0.87
Omega	0.94	0.89	0.92	0.94	0.90	0.84	0.88	0.89	0.87

Note: AUDIT = Alcohol use disorders identification test; CFQ = Chalder fatigue scale; DP = Depersonalization; EE = Emotional exhaustion; GAD-7 = Generalized anxiety disorder scale-7; ISI = Insomnia severity index; LEC-5 = Life events checklist for DSM-5; PCL-5 = Post-traumatic stress disorder checklist for DSM-5; PHQ-9 = Patient health questionnaire.

* $p < .01$, ** $p < .001$.

findings. First, PTSD was not a significant predictor of alcohol consumption, while anxiety, depersonalization, fatigue, and insomnia were significantly associated with alcohol consumption. The finding with regard to PTSD is in contrast to existing research. Bonumwezi and colleagues, for example, investigated substance use among first responders (emergency medical technicians, paramedics, and firefighters) and concluded that PTSD symptomology was significantly associated with alcohol and drug consumption (Bonumwezi et al., 2022). Similarly, Zegel and colleagues found that PTSD symptom severity was associated with alcohol use severity among a sample of firefighters (Zegel et al., 2019). Brunault and colleagues reported that PTSD was a significant predictor of the severity of alcohol use disorder among police officers (Brunault et al., 2019; Zegel et al., 2019).

Second, first responders who were at risk for harmful alcohol use had higher levels of distress compared to those not at risk.

Table 2.
Alcohol Use Predictors Among First Responders

Predictor	<i>B</i>	<i>SE</i>	95% CI	β	<i>p</i>
Depression	-0.01	0.11	-0.22, 20	-0.01	.94
Anxiety	0.28	0.12	0.04, 0.52	0.16	.02
PTSD	0.07	0.04	-0.01, 14	0.11	.10
Emotional exhaustion	0.04	0.07	-0.09, 0.17	0.05	.59
Depersonalization	0.22	0.09	0.04, 41	0.18	.02
Traumatic events	0.04	0.05	-0.06, 0.14	0.04	.40
Fatigue	-0.19	0.09	-0.37, -0.02	-0.13	.03
Insomnia	0.22	0.11	0.02, 0.43	0.13	.03

Note: PTSD = Post-traumatic stress disorder.

Notably, the prevalence of harmful alcohol use among first responders was 42.9% ($n = 184$), and 25.9% ($n = 111$) met the criteria for alcohol dependence. These rates exceed the 22% prevalence reported by Irizar and colleagues (2021) in their meta-analysis of hazardous and harmful alcohol use across trauma-exposed occupations (Irizar et al., 2021). Studies utilizing the AUDIT scale to measure alcohol use have reported prevalence rates among first responders ranging from 22.1% to 31% (Bonumwezi et al., 2022; Jones et al., 2018; Lebeaut et al., 2020). First responders who were at risk for harmful alcohol use reported elevated anxiety, depersonalization, depression, emotional exhaustion, insomnia and PTSD.

Third, first responders classified as alcohol dependent reported higher levels of psychological distress on all indicators compared to those who were not classified as alcohol dependent. This is in line with some of the findings in the existing literature and could be accounted for by the self-medication hypothesis (Bartlett et al., 2019; Jones et al., 2018; Zegel et al., 2019). In their meta-analysis of the self-medication hypothesis, Luciano and colleagues reported that coping-related alcohol consumption was a strong mediator of the relationship between PTSD and harmful alcohol use (Luciano et al., 2022). Similarly, emotional dysregulation, which underlies insomnia, PTSD, and mood and anxiety disorders, has been associated with alcohol dependence (Wołyńczyk-Gmaj et al., 2022). It is probable that individuals experiencing heightened distress may use alcohol as a form of self-medication to alleviate feelings of sadness or hopelessness, heightened anxiety, distressing PTSD symptomology and sleep disturbances. The temporary relief provided by alcohol may reinforce its use. Subsequent attempts to limit alcohol consumption may lead to intensive symptoms of withdrawal. This can create a cycle that perpetuates distress and reliance on alcohol for coping (Castillo-Carniglia et al., 2019; He et al., 2019; Wołyńczyk-Gmaj et al., 2022).

Table 3.*Results of Multivariate Analyses of Variance for Differences Between Harmful and Nonharmful Alcohol Use*

Independent Variable	Nonharmful Use (n = 245)		Harmful Use (n = 184)		F (1, 428)	p	η_p^2
	M	SD	M	SD			
Depression	8.1	6.4	11.4	5.9	29.05	<.001	0.06
Anxiety	6.2	5.8	9.8	5.4	42.34	<.001	0.09
PTSD	27.0	16.6	36.7	15.9	37.24	<.001	0.08
Emotional exhaustion	22.5	12.8	28.2	11.7	22.44	<.001	0.05
Depersonalization	10.8	7.7	14.6	7.7	25.00	<.001	0.06
Traumatic events	22.6	9.9	25.3	8.3	8.79	.003	0.02
Fatigue	13.7	7.1	15.4	6.3	6.61	.010	0.02
Insomnia	9.6	6.0	12.6	5.0	31.17	<.001	0.07

Note: Hotelling's $T^2 = 8.42$, $p < .001$.

In terms of the association between burnout and alcohol use, there are conflicting findings in the existing literature. In their systematic review, Ryan and colleagues found no significant association between burnout and alcohol abuse (Ryan et al., 2023). However, in an earlier study, Petersen and colleagues reported a strong association between depersonalization and alcohol use among physicians (Pedersen et al., 2016). This suggests that specific dimensions of burnout may be associated with increased vulnerability to harmful alcohol use.

The findings of the current study highlight the urgent need to implement interventions to improve first responder mental health in South Africa. Critical incident debriefing, mindfulness training, and cognitive behavioral therapy have been well-established as effective interventions in enhancing mental health among this population group. These interventions could be implemented at an organizational level to inhibit the use of alcohol to regulate emotional distress among South African first responders (Alden et al., 2021; Winders et al., 2021). Furthermore, addressing barriers to help-seeking (e.g., mental health stigma) through educational campaigns and the development of peer

support networks can promote the well-being of first responders (Jones et al., 2020). Future research should assess the effectiveness of targeted interventions aimed at reducing harmful alcohol use and enhancing resilience among first responders in the South African context.

To the best of our knowledge, this is the first study to investigate the association between harmful alcohol use and various indicators of psychological distress among South African first responders, specifically, police officers and paramedics. Although PTSD did not emerge as a significant predictor of harmful alcohol consumption, the findings underscore the association between mental health challenges and alcohol use among this population. These results emphasize the need for integrated interventions that address both psychological distress and harmful drinking behaviors.

This study had several limitations that should be acknowledged when interpreting the findings. The cross-sectional design of this study limited the ability to establish causal relationships between psychological distress and harmful alcohol use among first

Table 4.*Results of Multivariate Analyses of Variance for Differences Between Alcohol Dependence and Nonalcohol Dependence*

Independent Variable	Nonalcohol Dependence (n = 318)		Alcohol Dependence (n = 111)		F (1, 428)	p	η_p^2
	M	SD	M	SD			
Depression	8.5	6.4	12.3	5.5	30.64	<.001	0.07
Anxiety	6.7	5.7	10.8	5.2	44.07	<.001	0.09
PTSD	28.5	16.8	38.8	15.1	32.38	<.001	0.07
Emotional exhaustion	22.6	12.5	31.5	10.8	44.96	<.001	0.10
Depersonalization	11.1	7.6	16.3	7.4	39.68	<.001	0.09
Traumatic events	23.3	9.5	25.2	8.6	3.44	.06	0.01
Fatigue	13.8	7.0	16.1	6.0	9.00	.003	0.02
Insomnia	10.1	5.9	13.2	4.7	25.28	<.001	0.06

Note: Hotelling's $T^2 = 8.42$, $p < .001$.

responders. To better understand the causal relationships between harmful alcohol use, indices of psychological distress, and protective factors, longitudinal studies are needed. The study was conducted in one province of South Africa and among two categories of first responders, which may limit the generalizability of the findings to other regions within the country or to first responders in different cultural or socioeconomic contexts. Expanding the sample to include other first responder groups (e.g., firefighters) would provide a more comprehensive understanding of these issues. Self-reported data are subject to several biases, including social desirability bias, in which participants may under-report mental health symptoms or behaviors perceived as negative or stigmatizing, such as harmful alcohol use. While this study aimed to investigate a range of psychological factors, other unmeasured variables may have influenced the relationship between mental health and alcohol use among first responders. Factors such as personality traits, coping styles, social support systems, and organizational culture were not assessed but could play significant roles. Finally, this study did not assess psychiatric history, current treatment status, or use of medications. Hence, it is unclear how prior or ongoing mental health conditions and treatments may have influenced the findings. This underscores the need for future research to incorporate these factors to better understand their potential impact on alcohol use.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Ethics Committee Approval: Ethics committee approval was received for this study from the Humanities and Social Sciences Research Ethics Committee of the University of the Western Cape (ethics reference: HS23/2/4, May 23, 2023).

Informed Consent: Written informed consent was obtained from the participants who participated in this study.

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ORIGINAL ARTICLE

The Addiction Problems, Domestic Violence, and Limited Well-Being in the Risk of Suicide in Mexico

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Main Points

- High suicide risk was assessed in 8% in the State of Yucatan in post-coronavirus period.
- Violence at home and drug use were directly associated with suicidal behavior
- Alcohol use was only directly associated with suicidality
- There was a direct association between violence at home and alcohol use in women
- Mexican youth did not present any association between alcohol and suicidality

Abstract

Violence at home and substance use are psychosocial factors related to suicide behavior. In Mexico, it has been claimed to be highly associated with suicidality from adolescents to elderly population groups. This study explores the relationship between violence at home, alcohol and other drug use, well-being, and suicidality in Yucatan, which has one of the highest suicide rates worldwide, by gender and age groups. A cross-sectional study was carried out surveying 32,531 participants (age range 15 – 80) through the TEDUCA (electronic mental health screening for educational institutions) survey smartphone app. Partial least squares structural equation models were applied. High suicide risk was assessed in 8% of the sample. The model exhibited satisfactory measurement; violence at home and drug use were directly associated with suicidal behavior, while well-being was inversely associated; alcohol use was only directly associated with suicidality. The partial least squares structural equation models by gender showed a direct association between violence at home and alcohol use in women and a direct association between violence at home and suicidality in men. Regarding the partial least squares structural equation models by age groups, younger

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ages did not present any association between alcohol and suicidality. Violence at home and substance abuse can contribute to suicidality among different cohorts in the Yucatan population.

Keywords: Alcohol and other drug use, smartphone screening, suicide behavior, violence at home, well-being

Introduction

Contemporary research shows that suicidal behavior (SB) is associated with violence within the family (Brown & Seals, 2019) and the use of alcohol and other drugs (AOD) (Darvishi et al., 2015). Depression and anxiety, stated vital stressful events together with a family history of SB, and a history of AOD dependence were adverse conditions leading to commit suicide (Baca García & Aroca, 2014).

Mexico has demonstrated a comparatively high rate of suicide in comparison to numerous other countries. Mexico ranks 19th in suicides in the American continent (World Health Organization [WHO], 2021). Indeed, suicide is the 15th leading cause of death in Latin America. However, the research on the relationship between SB and AOD mental health problems in the Mexican population is still limited. Recent studies have highlighted the escalating rates of suicide in this country (Sánchez-Barriga, 2023), in which young men with depression and AOD dependencies (mainly alcohol) are particularly vulnerable.

The WHO (2021) reports that males aged 35–45, exhibit the highest rates, behind older males. Younger women aged between 15 and 24 years have the highest rate of suicidality. On the other hand, statistics from Mexico indicate slight variations (Dávila Cervantes et al., 2015; Sánchez-Barriga, 2023). The 20–24 years age group represents the highest number of suicides, with 12.9% for men and 2.9% for women. As a result, the highest rates of SB for Mexican males seem to occur in the 20–24 age group, while for females, the highest rates occur in the 15–19 age group.

The State of Yucatan has had one of the highest rates of SB during the last years (Dávila Cervantes et al., 2015), which has doubled the other Mexican states (Reyes-Foster, 2013). However, the patterns of SB have recently started to change (Sánchez-Barriga, 2023). Suicidality seems to have a relation with rural areas and low education levels (Reyes-Foster, 2013), while during the last three decades, it was usually caused by suffering, addiction, and societal violence starting at home (Olguin et al., 2011).

A significant number of Mexican adolescents turn to analgesics and antidepressants, with parental divorce and family dysfunction being identified as risk factors in half of all suicide cases (Sánchez-Barriga, 2023). Among Mexican adults, intentional self-poisoning through nonopioid analgesics, antipyretics, and antirheumatics has been found to account for 81.66% of female suicides over the past two decades. Meanwhile, 64.05% of male suicides are attributed to intentional self-harm. Nonetheless, beyond depression, the AOD factors, among other psychosocial predictors of such outcomes, remain unclear (Baca-García et al., 2022a, Martínez-Nicolás et al., 2022b).

Individuals diagnosed with substance use disorder are known to be at a heightened risk of suicide when compared to the general population. Although they may also exhibit aggressive behaviors, which can lead to interpersonal stress and conflict, research

into the relationship between these factors could prove to be a valuable tool in understanding the increased risk of SB in individuals with addiction. Exposure to violence at home can have independent effects on both internalizing and externalising outcomes (Mrug & Windle, 2010). Similarly, Zygo et al. (2019) found that self-harm behavior in adolescents is more common among females, those who use psychoactive substances, those who run away from home, those raised in single-parent families, those with family members addicted to alcohol, and those who have experienced violence. There is a strong association between adversities and SB, with the most consistent finding being the link between suicidal and sexual abuse experiences. Addressing these concerns is essential in preventing suicide within the Yucatan community.

The main aim of the present study is to explore the role of violence at home, AOD addiction problems, and well-being in the suicidality of the Yucatan State (Mexico) general population using the partial least squares structural equation modeling (PLS-SEM) approach. The specific aims are: to (a) investigate the connection between this type of violence and SB, through addiction problems and well-being, (b) measure both direct and indirect effects of domestic violence to explain SB, (c) expand the limited data on how domestic violence, unsuccessful well-being, and AOD dependence relate to SB among the Yucatan population in terms of age and gender, and (d) present empirical evidence to support the study's findings and offer present knowledge on relational nature and beyond descriptive Mexican studies.

Material and Methods

Settings & Design

This cross-sectional study was undertaken from January to December 2022 in the State of Yucatan (Mexico), which complied with the principles outlined in the Declaration of Helsinki. Ethical approval (Approval No: 002/2019 Date: 27 August, 2019) was granted by the Ethics Review Board of the Hospital Psiquiátrico Yucatán, Yucatan (Mexico). This protocol has been registered in ClinicalTrials.gov (Arenas-Castañeda et al., 2020).

Participants and Procedure

The study included a total of 32,530 Mexican participants from the general population in the State of Yucatan (gender balanced: 16,072 men and 16,267 women; age range: 15–80 years old). The data were retrieved in 2023 from the second wave of the SmartScreen project, through the TEDUCA survey (Martínez-Nicolás et al., 2022b). The TEDUCA is an ongoing online survey through a mHealth smartphone app named [Blinded for Review] (Berrouiguet et al., 2015), according to SmartScreen protocol (Arenas-Castañeda et al., 2020; Baca-García et al., 2022a).

The inclusion criteria were as follows: (1) age 15 years or above with enrollment at a participating institution; (2) ability to use either their smartphone or an organization-provided computer; (3) ability to understand the nature, purpose, and methodology of the study; (4) participation in accordance with express informed

consent granted in the app. The exclusion criteria were as follows: (1) students protected by law and (2) individuals deprived of liberty.

Variables

Violence at home (VH): This item consisted of an ordinal measure of the perceived violence the participant observed in his or her home at present - intrafamilial violence.

Suicidal Behavior (SB): The Columbia-Suicide Severity Rating Scale (C-SSRS) included seven yes/no items regarding the participant's risk of suicidality. The Spanish version used (Al-Halabi et al., 2016) showed good internal consistency (Cronbach's $\alpha = .81$), also used in a previous study with another cohort of participants (Martínez-Nicolás et al., 2022b).

Alcohol use (AU): The first three items of the C version of the Alcohol Use Disorders Identification Test (AUDIT-C) from the Spanish version (Rubio et al., 1998) was used to estimate a latent variable representing the identification of risk use patterns, answered on a scale of zero to four. A specific score was obtained, with higher values indicating a higher risk of alcoholism.

Drug use (DU): A measure of illicit drug use from the Ten (yes/no) items Drug Abuse Screening Test (DAST-10) in the Spanish version (Pérez Gálvez et al., 2010). A specific score was obtained, with higher values indicating higher drug use.

Perceived well-being (WB): Positive mental health was measured by the Spanish version of the WHO-5 (Martínez-Nicolás et al., 2022b), based on the well-being index questionnaire. The WHO considers positive well-being as a mental health term. In this indicator, higher numbers inform about better mental health.

These mental health tests have demonstrated adequate validity as a screening tool in several countries, including Mexico (Arenas-Castañeda et al., 2020).

Sociodemographic variables. Gender and age group (<25 years old, ≥ 25 years old) were included to perform the PLS-SEM and ascertain their effects on the risk of SB based on previous research in this field in the State of Yucatan (Dávila Cervantes et al., 2015; Sánchez-Barriga, 2023).

Statistical Analysis

Descriptive and exploratory analyses were performed to describe participant characteristics, including subgroup analyses by gender, age groups, working status, and test scores, using chi-square tests as appropriate (see Table 1). Correlational analyses were also made between pairs of variables with Spearman's r in the case of VH for its ordinal nature and with Pearson's r between the constructs (DU, AU, WB, SB).

Regarding the PLS-SEM modeling, the *SeminR* package (Hair et al., 2021) was used to run the model. The PLS-SEM has shown higher statistical power compared to other SEMs, being useful for exploratory research. Moreover, the PLS-SEM has the capability to evaluate latent constructs that are pertinent to this specific population. One structural model was built, including the variable Violence at home as a predictor of the other variables: Alcohol use, Drug use, Well-being, and Suicide behavior.

Furthermore, it was hypothesized that AOD use and Well-being would be moderators in the relationship between Violence at home and Suicidal behavior. Similarly, the relationship between Well-being and Suicide Behavior would be moderated by AOD use. The bootstrapping technique was used to obtain the statistical significance of the path coefficients and the CIs. A path coefficient was significant at the 5% level if the value zero does not fall into the 95% CI (see Table 2). The model's explanatory power was assessed by examining the endogenous constructs' coefficient of determination (R^2), which ranges from 0 to 1. To offer an alternative perspective on the results, the f^2 is also computed.

Results

The descriptive statistics are reported in Table 1. The median of the sample's age was 32, of which almost a third of the sample was younger than 25 years old, usually students. From the overall sample, a third had suffered usual violence at home, a fourth had low well-being, and 8% expressed high suicide risk (although 21.6% self-expressed some type of SB), 8% high alcohol risk use, and 5% drug use.

Previous to applying PLS-SEM, the bivariate correlations between the constructs were computed. The analyses revealed that all pairs of constructs were correlated, and the results were all significant. The degree of association varied, ranging from very weak associations (e.g., r WHO5-AUDIT-C = 0.01, and r C-SSRS-AUDIT-C = -0.01) to moderate associations (e.g., r WHO5-C-SSRS = -0.45).

With respect to the PLS-SEM results, the measurement models of Violence at home, Alcohol use, Drug use, Well-being, and Suicide behavior constructs were evaluated by internal consistency (i.e., Cronbach's alpha, and composite reliability), and convergent validity (i.e., average variance extracted (AVE) and the outer loading such as ρ_A). The reliability coefficients obtained in each measure ranged from acceptable to excellent (i.e., from $\alpha_{\text{Alcohol}} = 0.63$ to $\alpha_{\text{Well-being}} = 0.90$) due to its exploratory research nature. The convergent validity was assessed by AVE and ρ_A , which could be greater than 0.4 if the indicator is relevant and the corresponding AVE is satisfactory according to Riou et al. (2016). In this case, the lowest AVE were found in the addiction variables, Drug measure (0.2), and Alcohol measure (0.4). Similarly, the other measure of construct reliability was below the threshold (i.e., $\rho_{\text{Alcohol}} = 0.2$) probably due to the exploratory nature of the present study, but both are relevant constructs. Robustness checks were run to support the stability of the results reported (see Table 2). The PLS-SEM model analysis conducted yielded interesting findings, as presented in Table 2.

Regarding assessing the formative measurement model, the variance inflation factor (Becker et al., 2015), the highest is 1.039 between Suicide behavior and Well-being, which demonstrates the absence of collinearity. Concerning the assessment of the indicator weights' statistical significance and relevance (i.e., size), bootstrapping is used to determine statistical significance through the CI. In Figure 1, the general PLS-SEM bootstrap model structure, there is no relation between Violence at home and Alcohol use, as the CI of an indicator weight includes zero (Hair et al., 2017).

Table 1.

Study Population Characteristics. Sociodemographic variables (age, gender, and current activity) and social psychiatry dimensions by gender using the self-administered questionnaires contained within the app, indicating the level of severity for each psychological factor

Variable	Females (n = 16,267)	Males (n = 16,072)	p	Study Population (n = 32,531)
Age, median (IQR)	31.23	33.23	<.01	32.32
Age group			<.01	
Younger than 25	5727 (35.21%)	5422 (33.74%)		11,292 (29.15%)
25 or older	10,540 (64.79%)	10,650 (66.26%)		21,239 (65.13%)
Current activity			<.01	
Student (n, %)	4309 (29.59%)	4057 (28.35%)		8462 (34.71%)
Actively working (n, %)	9210 (63.24%)	9654 (67.46%)		18,906 (65.29%)
Violence at home			<.01	
Very frequent	2229 (15.45%)	1075 (7.6%)		3319 (16.14%)
Frequent	3076 (21.32%)	2449 (17.31%)		5571 (19.4%)
Not frequent	3571 (24.75%)	4258 (30.1%)		7870 (27.4%)
Inexistent	4941 (34.24%)	5673 (40.11%)		10,645 (37.06%)
C-SSRS			<.01	
No suicide risk, n (%)	12,938 (79.54%)	14,079 (87.6%)	<.01	27,106 (83.32%)
Low suicide risk, n (%)	889 (5.47%)	527 (3.28%)		1430 (4.4%)
Moderate suicide risk, n (%)	800 (4.92%)	485 (3.02%)		1307 (4.02%)
High suicide risk, n (%)	1640 (10.08%)	981 (6.1%)		2688 (8.26%)
DAST			<.01	
No drug use (n, %)	14,263 (95.85%)	13,851 (94.88%)	<.01	28,243 (95.32%)
Drug use (n, %)	617 (4.15%)	747 (5.12%)		1386 (4.68%)
AUDIT			<.01	
Low risk (n, %)	7058 (95.26%)	7488 (89.44%)	<.01	14,600 (92.18%)
High risk (n, %)	351 (4.74%)	884 (10.56%)		1239 (7.82%)
WHO-5			<.01	
Low well-being, n (%)	4173 (30.51%)	2256 (16.64%)	<.01	6515 (23.81%)
High well-being, n (%)	9503 (69.49%)	11,302 (83.36%)		20,853 (76.19%)

Note: %, percentage; AUDIT, three items of the Alcohol Use Disorders Identification Test; C-SSRS, Columbia-Suicide Severity Rating Scale; DAST, ten items of the Drug Abuse Screening Test; IQR, interquartile range; SD, standard deviation; WHO-5, World Health Organization Well-being Index.

The assessment of the structural model results allows us to detect the predictive capabilities of the general proposed model (see Figure 1). As PLS - SEM focuses on exploration, the quantification of the hypothesized relationships within the inner model is of primary interest. The coefficient of determination (R^2) measures the variance explained in each of the endogenous constructs, being a measure of the model's explanatory power (Shmueli & Koppius, 2011). The R^2 within the present general model could be considered weak (Henseler et al., 2009), as the highest coefficient was in Suicide behavior ($R^2 = 0.22$), although according to Riou et al. (2016) the values obtained, it could be classed as medium effects (except for the Alcohol: $R^2 = 0.01$). However, as low as 0.10 are usually considered satisfactory when predicting stock returns, and the lesser the number of predictor constructs, the lower the R^2 .

Only inverse significant relationships were observed between Well-being and the other four constructs. The first PLS-SEM general model revealed that more Violence at home was a significant

predictor of more Drug use, more Suicidal behavior, and less Well-being. Violence at home had a positive association with Drug use and Suicidal behavior while exhibiting a negative association with Well-being. However, the analysis did not find any significant correlation between Violence at home and Alcohol use. Indeed, the study revealed that Drug use and Alcohol use were positively correlated with Suicidal behavior, while Well-being demonstrated a negative correlation with Suicidal behavior. Finally, Well-being displayed a negative correlation with Drug and Alcohol use.

Regarding the second PLS-SEM analysis by gender (see Figure 2, Figure 2.1), it was determined that there was no correlation between Violence at home and suicidal tendencies among women. However, the consumption of alcohol was found to have a positive association with suicidal behavior, as evidenced by Figure 2. Consequently, women who exhibited drug and alcohol use, in addition to experiencing low levels of well-being, were found to be at a higher risk of suicidal behavior. This pattern,

Table 2.*Path Coefficients of Main and Subgroup Partial Least Squares Structural Equation Modelling Models*

PLS-SEM Model Path	Original. Est.	Mean	Standard Deviation	TStatistic	95% CI
Main model					
Violence at home → Well-being	-0.142	-0.143	0.006	-22.402	-0.154, -0.129
Violence at home → Drugs	0.023	0.023	0.006	4.149	0.013, 0.034
Violence at home → Alcohol	-0.002	-0.003	0.008	-0.3	-0.018, 0.014
Violence at home → Suicide Behavior	0.02	0.02	0.005	3.713	0.01, 0.03
Well-being → Drugs	-0.115	-0.114	0.008	-13.585	-0.132, -0.099
Well-being → Alcohol	-0.075	-0.076	0.006	-13.024	-0.087, -0.065
Well-being → Suicide Behavior	-0.42	-0.421	0.005	-80.399	-0.43, -0.411
Drugs → Suicide Behavior	0.133	0.135	0.01	13.832	0.115, 0.154
Alcohol → Suicide Behavior	0.043	0.044	0.006	7.294	0.032, 0.055
Females					
Violence at home → Well-being	-0.102	-0.101	0.008	-12.593	-0.116, -0.088
Violence at home → Drugs	0.019	0.02	0.007	2.697	0.006, 0.034
Violence at home → Alcohol	0.027	0.027	0.009	2.88	0.009, 0.045
Violence at home → Suicide Behavior	0.011	0.011	0.007	1.71	0.001, 0.025
Well-being → Drugs	-0.125	-0.125	0.009	-13.877	-0.143, -0.11
Well-being → Alcohol	-0.112	-0.112	0.007	-15.181	-0.125, -0.099
Well-being → Suicide Behavior	-0.43	-0.429	0.006	-67.436	-0.441, -0.416
Drugs → Suicide Behavior	0.13	0.135	0.012	10.726	0.114, 0.157
Alcohol → Suicide Behavior	0.049	0.05	0.009	5.275	0.033, 0.07
Males					
Violence at home → Well-being	-0.14	-0.139	0.008	-17.21	-0.154, -0.123
Violence at home → Drugs	0.038	0.038	0.01	3.951	0.02, 0.056
Violence at home → Alcohol	0.047	0.048	0.011	4.455	0.028, 0.067
Violence at home → Suicide behavior	0.027	0.027	0.008	3.322	0.011, 0.041
Well-being → Drugs	-0.113	-0.111	0.018	-6.455	-0.142, -0.081
Well-being → Alcohol	-0.083	-0.083	0.008	-10.169	-0.098, -0.067
Well-being → Suicide Behavior	-0.375	-0.375	0.009	-40.581	-0.391, -0.357
Drugs → Suicide Behavior	0.151	0.157	0.018	8.258	0.122, 0.191
Alcohol → Suicide Behavior	0.009	0.008	0.008	1.133	-0.007, 0.024
<25 Years Old					
Violence at home → Well-being	-0.136	-0.136	0.01	-14.309	-0.154, -0.121
Violence at home → Drugs	0.031	0.031	0.01	3.166	0.009, 0.051
Violence at home → Alcohol	0.044	0.044	0.011	3.839	0.024, 0.066
Violence at home → Suicide Behavior	0.041	0.042	0.009	4.372	0.025, 0.057
Well-being → Drugs	-0.098	-0.103	0.012	-8.187	-0.126, -0.08
Well-being → Alcohol	-0.042	-0.042	0.012	-3.536	-0.064, -0.018
Well-being → Suicide Behavior	-0.433	-0.433	0.008	-56.366	-0.447, -0.419
Drugs → Suicide Behavior	0.154	0.154	0.014	10.686	0.129, 0.177
Alcohol → Suicide Behavior	0.001	0.002	0.009	0.114	-0.017, 0.018

(Continued)

Table 2.*Path Coefficients of Main and Subgroup Partial Least Squares Structural Equation Modelling Models (Continued)*

PLS-SEM Model Path	Original. Est.	Mean	Standard Deviation	TStatistic	95% CI
>25 Years Old					
Violence at home → Well-being	-0.165	-0.165	0.007	-24.438	-0.176, -0.15
Violence at home → Drugs	0.022	0.022	0.007	3.192	0.007, 0.034
Violence at home → Alcohol	0.013	0.012	0.007	1.829	-0.002, 0.026
Violence at home → Suicide Behavior	0.029	0.029	0.006	4.928	0.019, 0.04
Well-being → Drugs	-0.102	-0.104	0.012	-8.142	-0.126, -0.079
Well-being → Alcohol	-0.075	-0.075	0.008	-9.256	-0.09, -0.06
Well-being → Suicide Behavior	-0.332	-0.329	0.008	-41.907	-0.345, -0.316
Drugs → Suicide Behavior	0.127	0.131	0.016	7.681	0.099, 0.161
Alcohol → Suicide Behavior	0.046	0.047	0.009	5.358	0.031, 0.061

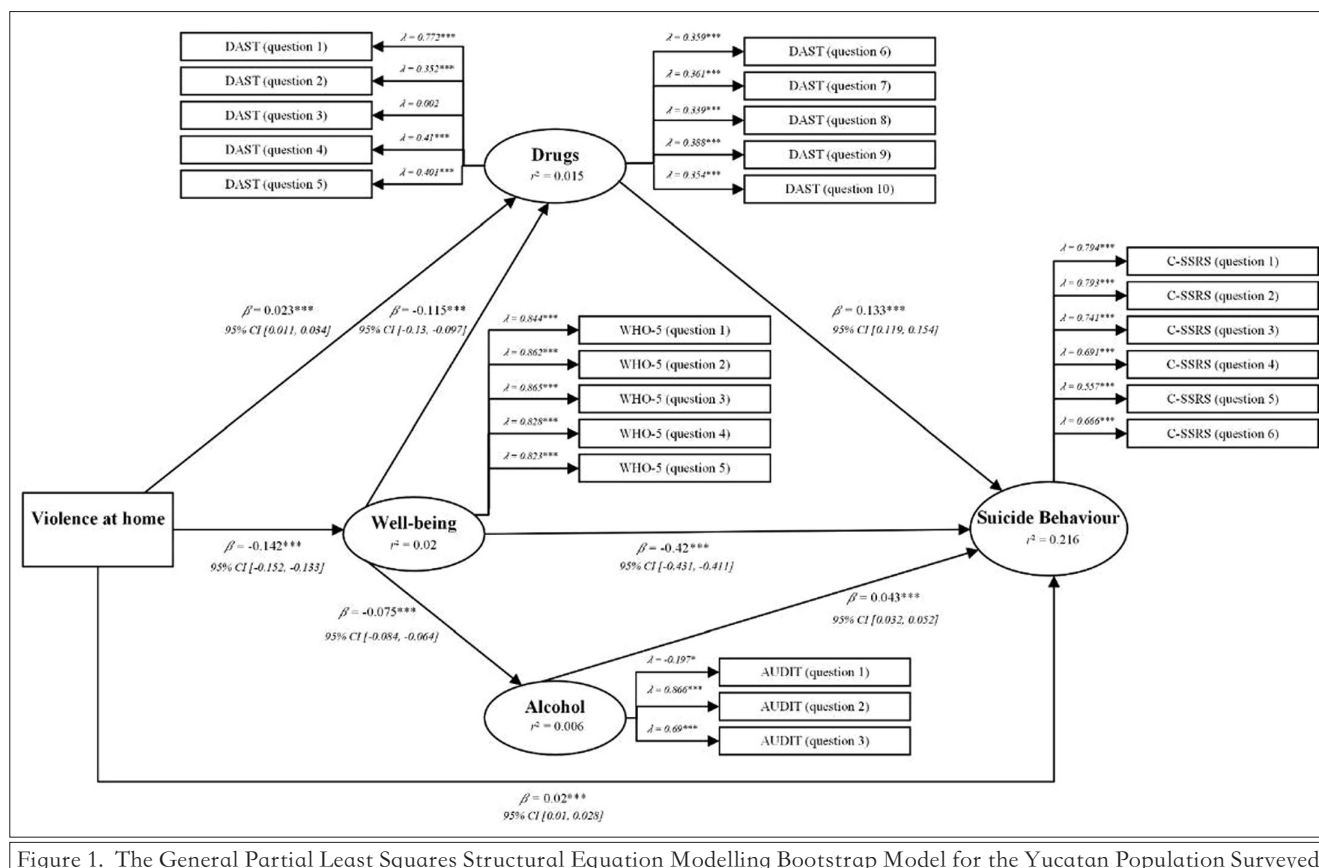
however, was not exactly observed in men, as those who displayed home violence, drug use, and low levels of well-being were more likely to exhibit suicidal behavior, as shown in Figure 2.1. Overall, the main predictor of suicidal behavior in the entire study population was found to be drug use, whereas alcohol use was only a competing factor for women, while violence at home was only a competing factor for men.

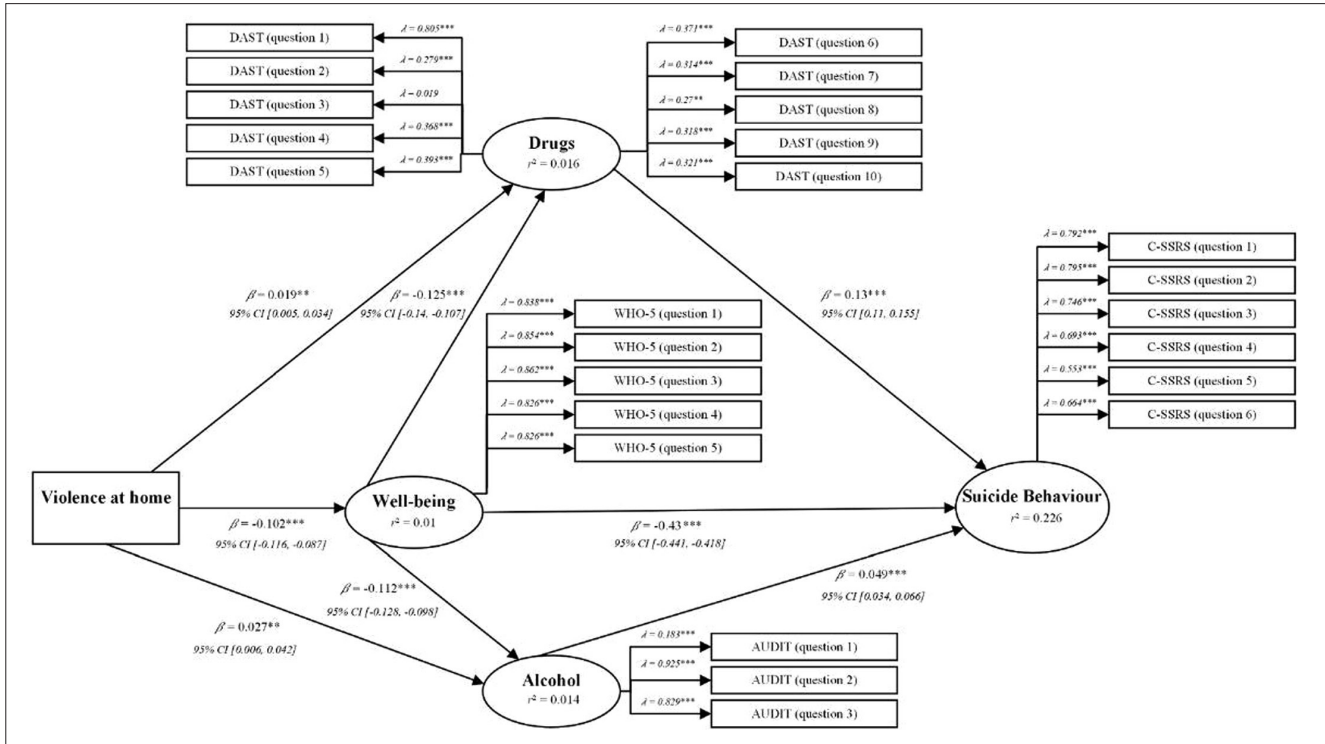
The third PLS-SEM analysis demonstrated a positive relationship between Violence at home and all latent factors for both age groups, indicating the same underlying constructs for each group (see Figures 3 and 3.1). However, the nature of the relationship with Alcohol use differed somewhat. For those aged 25 years and

older, there was a clear association between Violence at home and Suicidal behavior. This connection was positive through Drug use, negative through Well-being, and subsequently positive through Alcohol use (see Figure 3.1). In contrast, the younger population under 25 years old did not exhibit a pathway from Alcohol use to Suicidal behavior (see Figure 3).

Discussion

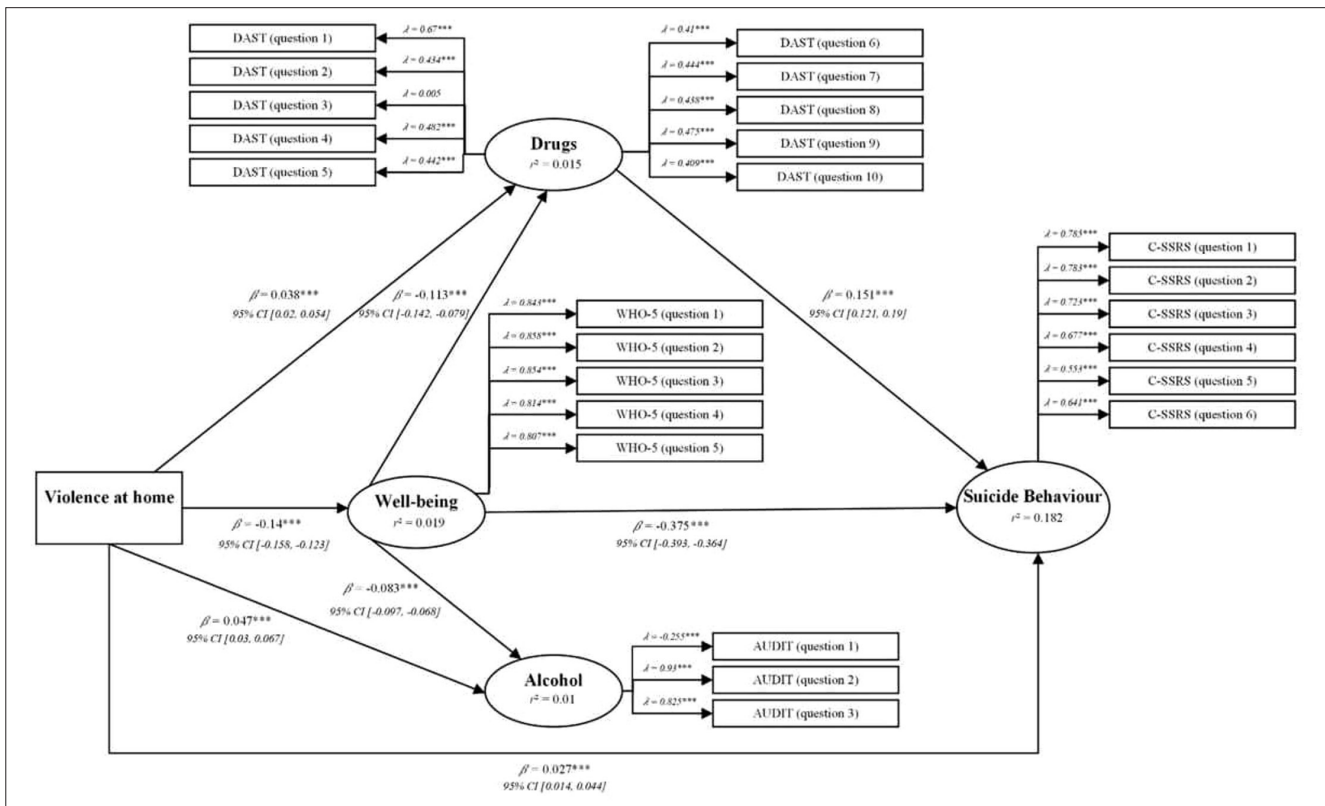
The present study endeavors to examine the influence of violence at home, alcohol and drug abuse, and overall well-being on suicide rates in the Yucatan population, spanning from adolescence to adulthood.

**Figure 1.** The General Partial Least Squares Structural Equation Modelling Bootstrap Model for the Yucatan Population Surveyed.



The present study addresses the limitations of prior research in suicidal behavior by utilizing a PLS-SEM, which allows for the simultaneous analysis of the effects of domestic violence on various variables, such as AOD and well-being, to determine the root cause of suicidality.

Research has demonstrated an association between domestic violence and suicidal behavior, particularly among males. The negative impact of emotional abuse in a domestic setting on mental health has been found to lead to preventable morbidity and mortality (Fischbach, & Herbert, 1997). However, the present study



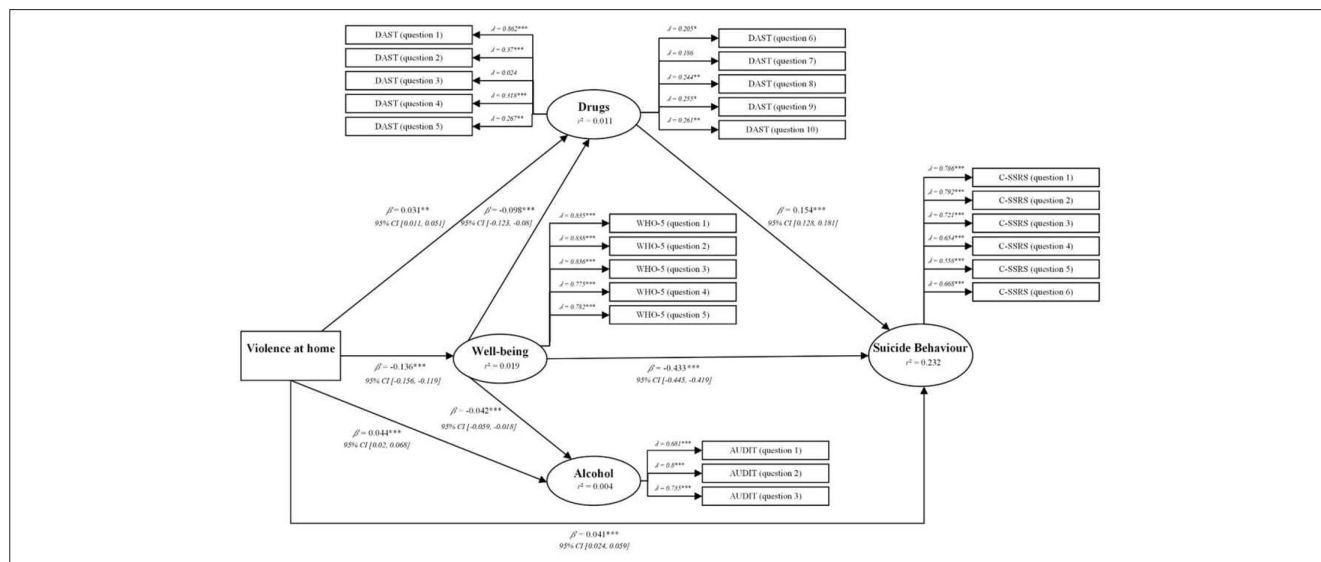


Figure 3. Partial Least Squares Structural Equation Modelling Bootstrap Model Structure for Study Population Under 25.

has determined that the effect of domestic violence on suicidality varies for men and women in the Yucatan region. In the case of Mexican males, violence in the home appears to have a noteworthy impact on their likelihood of suicide (Dávila Cervantes et al., 2015; Sánchez-Barriga, 2023), potentially due to a variety of factors. Two nationally conducted studies in Mexico in 2020 and 2021 examined the social determinants associated with suicidal ideation within the population. The first study identified several significant risk factors, including being a young woman, educational attainment, single marital status, unemployment, adherence to social distancing measures, living alone, loss of a family member due to COVID-19, a diagnosis of depression, experiences of physical violence, excessive alcohol consumption, drug use, and suspicion or diagnosis of Covid-19 (Gómez-García et al., 2023). The second study found that individuals who had experienced physical violence exhibited a more than sixfold increase in the prevalence of suicide attempts in the country, with findings indicating no significant differences between genders (Valencia et al., 2023).

Recent findings suggest that intimate partner violence may be a precursor to a significant number of male suicides (Kafka et al., 2022), underscoring the need for targeted interventions such as suicide screening and referral programs for this subpopulation (Martínez-Nicolás et al., 2022b). A similar study conducted in Spain after the pandemic showed that family violence, specifically physical abuse, and parental mental illness were the main factors contributing to an increased risk of male suicidal behavior (Navarro-Mateu et al., 2024). Other studies have also shown that losing a close personal relationship, typically a domestic partner, is a common factor among alcoholic men who commit suicide.

The present study has also revealed that poor psychological well-being affected approximately a quarter of the surveyed population in the State of Yucatan. Additionally, in the same period, a recent study undertaken in the State of Jalisco in response to the psychosocial impact of the coronavirus (COVID-19) pandemic

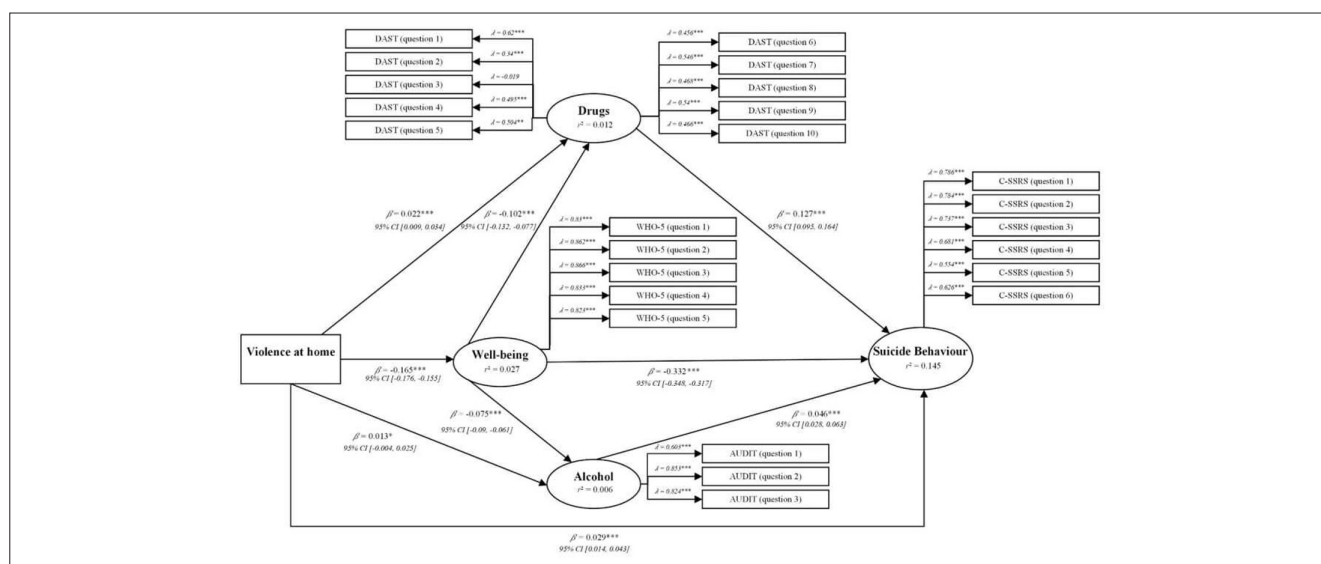


Figure 3.1. Partial Least Squares Structural Equation Modelling Bootstrap Model Structure for Study Population Older than 25.

found that 26.8% of adolescents self-reported suicidal ideation (Gómez Delgado et al., 2024). This figure is similar to the 21.6% observed in the State of Yucatan sample, which includes all life-span stages. The primary predictors identified for this type of suicidal behavior between both studies included health-related quality of life (e.g., violence at home) and low psychological well-being, in addition to AOD use or abuse stemming from impulsive behaviors that may be attempts to cope with emotional problems or a dysfunctional form of tolerating distress, among other contextual factors. Certainly, well-being is significantly associated with suicidality in the Yucatan population, irrespective of the sociodemographic factors under consideration. The present study was conducted in the aftermath of the COVID-19 pandemic, which has had a significant impact on global well-being.

Another recent American study investigating the relationship between well-being and suicidality during a comparable post-COVID period has demonstrated that higher levels of psychological well-being were associated with a reduced risk of suicidal ideation, recent suicide attempts, and non-suicidal self-injury (McCollum et al., 2025). It also observed that well-being did not serve as a moderating factor in the relationship between intimate partner violence and suicidality. In contrast, the present study found that well-being mediated the relationship between domestic violence and suicidality. This discrepancy may be influenced by the type of violence studied, among other psychological and contextual factors. Particularly in Mexico (Baca-García et al., 2022a, Martínez-Nicolás et al., 2022b), depression was the primary factor influencing higher anxiety levels, the risk of suicidal behavior, and lower levels of self-perceived well-being among high school and university students. Two other recent Mexican studies conducted before and after the outbreak found a marked increase in the incidence of suicidal ideation during the post-COVID-19 period (Borges et al., 2022; Borges et al., 2024). The largest surge in the number of suicides was attributed to men, who have been disproportionately affected by unemployment during the pandemic, and among those with a heightened sense of vulnerability, poor coping mechanisms, and pre-existing mental illnesses (Borges et al., 2024).

Regarding AOD use and suicidal behavior, according to Romero-Pimentel et al. (2018), on one hand, the retired Mexican men who committed suicide were more likely to consume alcohol. Among those who tested positive for any substance, alcohol was the principal substance used at the time of death for both genders, followed by other drugs such as cocaine, inhalants, and sedatives for men, and cocaine for women. The study found that nearly 54% of male victims were alcohol users, and 40% were positive in the toxicology test at the time of death. However, the present findings suggest that the Yucatan male population did not develop suicidal behaviors due to alcohol consumption, as drug use and domestic violence were identified as predictors of suicidality. It is remarkable that women who use alcohol present suicidal behaviors, which differs from the traditional fact that Mexican men who use alcohol are more likely to commit suicide.

According to Conner and colleagues (2010), Latin American populations face cultural challenges in identifying problems with substance abuse due to religious factors. Additionally, the complexity of disentangling life events and drinking adds to the difficulty of addressing the issue. The prevalence of alcohol use

among battered American women compared to men is consistent with current findings regarding alcohol use in females cited in this study. Indeed, a psychological autopsy study analyzing the period between 2007 and 2014 in the State of Tabasco revealed that females were older than males, mostly housewives with more years of schooling, yet did not consume alcohol at the time of their death (González-Castro et al., 2016). Based on the current findings, it can be inferred that women from the State of Yucatan who use alcohol exhibit suicidal behaviors. The initial step towards suicidality is a complex issue that requires careful consideration. A noteworthy study conducted in Mexico about suicide notes revealed that an array of factors was associated with suicide in this Latin American country, particularly interpersonal problems (Chávez-Hernández et al., 2006). This highlights the significance of addressing interpersonal issues early on and underscores the importance of promoting mental health and well-being.

Limitations and Directions/Suggestions for Future Research

It is important to note that this study is not without its limitations. On one hand, the screening process conducted through [Blinded for Review] app utilized a non-probabilistic sample to elicit responses that are comparable to those obtained from previous Mexican studies conducted with student populations. Another limitation of this study is that individuals without access to smartphones may have been excluded, although local reports suggest that the majority of participants owned one. A third limitation pertains to the utilization of an abbreviated versions of the original AUDIT and the measure for domestic violence. This single-item strategy is commonly used to estimate the national prevalence of interpersonal violence victimization in Mexico (Valencia et al., 2023). However, subsequent research endeavors could consider employing a comprehensive psychometric scale to estimate the construct of violence and its correlation with SB. While the results obtained through the PLS-SEM methodology were deemed acceptable given the exploratory nature of this study, some analytical limitations were still reported.

In conclusion, the present study aimed to investigate the predictive value of domestic violence and addictive behaviors on suicidal tendencies, considering the role of well-being in a large sample of late adolescents and adults from the State of Yucatan, Mexico. To achieve this, the TEDUCA survey was administered via the [Blinded for Review] smartphone app as an early detection tool, and the data were descriptively and relationally analyzed using PLS-SEM analysis. The findings indicated that a fifth of the sample displayed suicidal behaviors to some degree, while a third experienced violence at home, a fourth low well-being, an 8% high alcohol risk use and a 5% drug use. Nevertheless, the main predictor of suicidal behavior was drug use, while alcohol use was only a risk factor for women, and violence at home for men. Interestingly, women exhibited a link between violence at home, addictive behaviors, and suicidal tendencies, while men demonstrated a direct relationship between violence at home and suicidality, mediated only by drug use. Furthermore, no association between alcohol use and suicidality was observed in younger age groups, although these groups were usually students. These findings indicate that violence at home and substance abuse contribute to suicidality in various age cohorts in the Yucatan population as risk factors. Early identification and individualized treatment options for individuals at risk of suicide are

paramount. However, further research encompassing diverse sociodemographic groups and employing alternative scales may yield more comprehensive and precise insights into predicting suicidality to develop prevention programs.

Data Availability Statement: Data supporting the results of the present study will be made available from the corresponding author upon reasonable request.

Ethics Committee Approval: This prospective cohort study was undertaken from January to December 2022 in the State of Yucatan (Mexico), which complied with the principles outlined in the Declaration of Helsinki (World Medical Association, 2013). Ethical approval (002/2019) was granted by the Ethics Review Board of the ‘Hospital Psiquiátrico Yucatán’, Yucatan (Mexico).

Informed Consent: Informed consent was obtained from participants who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – E.B.G., O.L.F.; Design – F.A.B.B., E.B.G., C.M.P., P.M.B.; Supervision – E.B.G.; Resources – F.A.B., C.M.P.; Materials – C.M.P.; Data Collection and/or Processing – C.M.P., P.V.S.; Analysis and/or Interpretation – P.V.S., I.M.M., O.L.F.; Literature Search – O.L.F.; Writing Manuscript – O.L.F., I.M.M., P.V.S.; Critical Review – E.B.G., O.L.F., F.A.B.B., C.M.P., P.M.B., F.A.B., P.V.S., I.M.M.

Declaration of Interests: E.B.G. has been a consultant to, or has received honoraria or grants from, Janssen Cilag, Lundbeck, Otsuka, Pfizer, Servier, and Sanofi. E.B.G. designed the MEMind application. The other authors have no conflict of interest to declare.

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ORIGINAL ARTICLE

Quality and Reliability of YouTube™ Videos of Methamphetamine Addiction

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Main Points

- YouTube™ videos created by healthcare professionals about methamphetamine addiction have higher quality, reliability, and usefulness scores than those of videos which were created.
- Duration of videos, number of days since uploading, number of views, comments, and likes are positively related to the reliability, information accuracy, quality score, and the content usefulness scores of the videos. It may be useful for viewers to pay attention to these criteria when choosing videos.
- When producing video content on methamphetamine addiction, it is crucial to consider factors such as information flow, consistency, visual aids, and content enrichment.

Abstract

Methamphetamine addiction has become one of the most serious health problems in Türkiye. With this study, we aimed to evaluate the reliability, usefulness, and quality of YouTube™ videos about methamphetamine addiction. We used the term “meth addiction” to search for videos. The first 204 videos were preliminarily assessed; 148 videos met the inclusion criteria and were scored. Quality Criteria for Consumer Health Information (DISCERN) and the video information and quality index were used for evaluation. The content usefulness index was created by the researchers to evaluate content items. Video narrators were categorized as methamphetamine addicts, healthcare professionals, and organizations. In terms of quality and content, videos prepared by healthcare professional had higher reliability scores, flow scores, and information accuracy scores compared to videos prepared by methamphetamine addicts and organizations ($p < .005$). Significant positive correlations were identified between video features, reliability scores, quality scores, and content usefulness in healthcare professionals’ videos. However, the quality and usefulness scores of all groups were found to be below average. This study shows that the relationships between the reliability, quality, and usefulness of the video content should be considered. Utilizing information from reliable sources will contribute to the creation of more useful content.

Keywords: Methamphetamine addiction, reliability, usefulness, video quality, YouTube

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Introduction

Methamphetamine use is increasing both in Türkiye and around the world. In its 2023 report, the European Monitoring Center for Drugs and Drug Addiction underlines that approximately 81% of the methamphetamine amount in Europe was seized in Türkiye and that this amount increased by 375% compared to the previous year (European Monitoring Center for Drugs and Drug Addiction, 2023). In America, 1.6 million people used methamphetamine in 2021; it

is seen that the usage rate increased by 45.5% compared to 2019 (Substance Abuse and Mental Health Services Administration, 2022). In 2021, 32 537 people died due to psychostimulant overdoses, the majority of which were due to methamphetamine (National Institute on Drug Abuse, 2024).

Methamphetamine is a powerful stimulant with significant effects on the central nervous system. Its use can lead to a range of serious physical and psychological effects, both short-term and long-term

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(Petit et al., 2012). In the short term, users experience increased energy, enhanced physical performance, appetite suppression, and euphoria. But in the long term, it may cause serious heart problems, dental issues, brain damage, and skin problems. Long-term use of drug also causes addiction and severe psychiatric problems such as anxiety, paranoia, hallucinations, psychotic disorders, and anxiety disorders (Petit et al., 2012). Overdose causes significant morbidity and mortality among methamphetamine users (Marshall & Werb, 2010).

The internet and social media are increasingly important for examining substance abuse problems and disseminating resources and solutions (Kilgo & Midberry, 2020). YouTube™ and other video-sharing sites enable both users and healthcare professionals (HPs) to share their knowledge and experiences. The majority of active internet users seek health-related information online (Cesur et al., 2024). YouTube™, the largest video-sharing platform, is used to examine and support mental health issues (Manning, 2013). However, there is limited information on how the issue of addiction is addressed and how addiction-related video content is framed.

Due to the popularity of addiction, more and more videos about methamphetamine addiction are released every day. Questions are raised about whether these increasing contents are a source of misinformation and misdirection, as well as the quality and reliability of the videos (Cesur et al., 2024; Manning, 2013). Questions regarding the quality of the videos, whether they support addiction treatment, and the potential for them to glamorize addiction are becoming more prevalent.

Misinformation on social media about methamphetamine addiction may adversely affect patients' treatment and help-seeking behavior. The quality of information regarding addiction and methamphetamine addiction on YouTube remains largely unexplored. Currently, no studies have examined YouTube™ videos concerning methamphetamine addiction. We hypothesize that the most frequently viewed YouTube™ videos are predominantly shared by non-HPs and lack scientific accuracy. We assume that these videos on methamphetamine addiction are biased, incomplete, or inaccurate. The aim of this study is to evaluate the quality, reliability, and content of YouTube™ videos about methamphetamine addiction. This study also evaluates the accuracy of the information that people are exposed to about methamphetamine addiction and its alignment with scientific data.

Material and Methods

Google Trends application (<https://trends.google.com>) is a service that provides users with statistical information on which region, in which languages, and how often word or sentence queries are searched. In this research, this website was used to determine the most frequently used search term worldwide for "methamphetamine addiction", and a search was made using various keywords for this purpose. Search criteria are restricted to the last 5 years and worldwide. The keywords used for searching were "methamphetamine addiction" and "meth addiction." According to the comparison search results, the most frequently used search term was determined to be "meth addiction" (Google Trends, 1 June, 2024).

In this study, YouTube™ (<https://www.youtube.com>) was utilized to search for videos on "meth addiction." A search was conducted using the term "Meth addiction," and the results were ranked according to their relevance to the subject (1 June, 2024). To prevent bias, all cookies and search history were cleared prior to the search. Research on search engine user behavior indicates that users typically evaluate results on the first page, focusing primarily on the top few results without scrolling further (Lewandowski, 2009). It has been noted that most of (90%) internet users click within the first three pages of results, with fewer users exploring beyond the first page if they do not find their desired results (Cesur et al., 2024). Consequently, this study evaluated the first 204 videos rather than all results. Due to the potential changes in video order from searches conducted on different days as new videos are added, a playlist was created from the evaluated videos in the same sequence, and the source locators (URLs) were recorded. Multi-part videos were treated as single entries.

YouTube™ ads and videos created by brands were eliminated from the evaluated videos. Again, videos that are not in English, not related to the topic, do not contain audio, video, or subtitles, and are repetitive were excluded from evaluation. It is reported that search engine users generally view the first few results and the average session duration is less than 15 minutes (Cesur et al., 2024; Lewandowski, 2009). Therefore, in our research, videos longer than 15 minutes were not included for evaluation, and as a result, 148 videos that met all criteria were scored. All evaluations were made simultaneously and unaware of each other by two psychiatrists (... and ...), and inter-rater reliability was calculated. Three days after the initial evaluation, 15 out of the 148 scored videos were selected randomly via a randomization website (<https://www.randomizer.org>). These videos were then re-evaluated in order to assess intraobserver reliability. Since the research was conducted only through YouTube™ videos, informed consent was not obtained. Ethical approval for this study was obtained from Acibadem University Ethics Committee (approval number: 2024-9/342).

The video narrators were categorized as individuals sharing their experiences/methamphetamine addicts (MA), HPs, and organizations (media and non-governmental organizations) (ORG).

Video Assessment

All videos were watched from start to finish. The number of views, the number of likes, the number of comments, the time since upload, and the video duration (minutes) were recorded. Using these data, the viewing rate formula was used (Cesur et al., 2024). A similar formula was used in this research and recorded for each video: number of views / since upload time.

Video power index (VPI) was used to measure both the view and the like ratio of the videos. The VPI was calculated with the formula which was created in 2021. The number of likes multiplied by the total number of views divided by 100 was the formula (Salman & Bayar, 2021).

DISCERN (Quality Criteria for Consumer Health Information) is an assessment tool introduced in 1999, designed to evaluate written health research. It comprises a total of 16 questions (Charnock et al., 1999). Although the DISCERN instrument is highly effective

for assessing the reliability and quality of written texts, some questions of the instrument may not be fully applicable to web and video formats. Consequently, previous studies have opted to use a modified version of this scale. It consists of five questions in order to evaluate the reliability of information in videos (Cesur et al., 2024; Singh et al., 2012). For this reason, in this study, the use of the modified index consisting of five questions was preferred in evaluating video reliability. When evaluating the reliability scores of the videos, each question was scored as 0 (no) or 1 (yes), and the total score (ranging from 0 to 5) was recorded (Table 1).

The video quality was evaluated with the video information and quality index (VIQI). This index meets every component of the Global Quality Scale (GQS), which is used for the evaluation of websites' quality (Kumar et al., 2014; Naggal et al., 2015). While GQS was used to determine video quality in some previous similar studies, VIQI was preferred to evaluate video quality in this study because the GQS is not suitable for evaluating videos. Video information and quality index is a five-point Likert scale. It evaluates video quality (Cesur et al., 2024). The total quality scores of the videos were calculated by summing the scores from each of the following fields: information flow, information accuracy, quality (one point each for the use of images, use of animation, conducted interviews, video subtitles, use of summary report), and precision (the level of harmony between the video title and content). Each field was scored from 0 (poor quality) to 5 (high quality). These scores are totaled to obtain a total quality score ranging from 0 to 20.

In order to assess the usefulness of the video content, a usefulness index comprising 10 steps was developed: 1. Definition of methamphetamine, 2. Definition of methamphetamine addiction, 3. Symptoms of methamphetamine addiction, 4. Symptoms of methamphetamine withdrawal, 5. Symptoms of methamphetamine intoxication, 6. Physical consequences of methamphetamine addiction, 7. Psychiatric effects of methamphetamine addiction, 8. Treatment of methamphetamine addiction, 9. Cost Information, 10. Duration of treatment. Based on whether the video contained information about the relevant topics, each section was assigned a score of 0 or 1, and a "total content usefulness score" was calculated. The scores were categorized as follows: a score of 0 indicated not useful, scores of 1 – 4 indicated slightly useful, scores of 5 – 7 indicated moderately useful, and scores of 8 – 10 indicated very useful.

Statistics

SPSS software version 27.0 (IBM SPSS Corp.; Armonk, NY, USA) was used for the statistical analyses. Descriptive statistics were

used in order to evaluate the characteristics of the videos, such as frequencies, percentages, standard deviations, and means.

Inter-rater reliability was assessed using the intraclass correlation coefficient (ICC) for each of the video quality indices (DISCERN score, VIQI score, and content usefulness index). An ICC value greater than 0.75 was considered as an excellent reliability.

The videos were categorized based on the type of content narrator (methamphetamine addicts (MA), HPs, and ORG. One-way ANOVA was used to compare the mean scores of video characteristics (e.g., number of views, likes, comments, duration) and quality (DISCERN score, VIQI score, and content usefulness index) among the different groups. Post-hoc analyses were conducted using the Tukey HSD test to identify significant differences between specific group pairs.

Pearson correlation coefficients were calculated to explore the relationships between video characteristics (e.g., duration of videos, number of likes, views, comments) and the quality indices (DISCERN score, VIQI score, and content usefulness index) for HPs. $p < 0.05$ was accepted to be statistically significant.

Results

In the initial evaluation of the videos, a total of 204 videos were recorded. Videos shorter than 1 minute and longer than 15 minutes, videos without subtitles/audio, and videos unrelated to the search topic or related to other substances were excluded. The remaining 148 videos were analyzed (Table 2).

The inter-rater correlation coefficients ranged from 0.754 to 0.981. This correlation indicates a high level of agreement between raters. Consistency in repeated assessments was demonstrated, with intra-observer correlation coefficients ranging from 0.941 to 0.985 for the first rater and 0.885 to 0.982 for the second rater. Consequently, the statistical analyses were conducted based on the evaluations by the researchers.

The mean reliability score of DISCERN was 1.91 ± 1.51 . The mean VIQI total score was 9.66 ± 5.56 . The mean scores for the VIQI quality criteria were as follows: video flow (2.32 ± 1.43), information accuracy (2.45 ± 1.73), consistency (2.68 ± 1.52), and quality (2.22 ± 1.56). The content usefulness score, created by the researchers and consisting of 10 items with a range of scores between 0 and 10, was determined to be 3.01 ± 2.34 (Table 3).

The videos were divided into three groups based on who prepared them. When comparing the groups in terms of the content

Table 1.
Assessment of Reliability Scores of Videos

1. Are the goals clearly defined, and have they been successfully accomplished?
2. Are the sources of information reliable? (Has research been used or cited to support the claims? Is the person providing the information an expert in the field? etc.)
3. Is the information balanced and unbiased?
4. Are additional sources for information recommended for patients?
5. Are contradictory or uncertain issues mentioned?

Table 2.
Reasons for Excluding Videos

Reasons for Exclusion	Number of Videos
Longer than 15 minutes	40
Shorter than 1 minutes	4
No audios/subtitle	2
Not related to subject	3
Related about another substance	4
Same videos	3

Table 3.
Descriptive Statistics for Videos

<i>n</i> : 148	Minimum	Maximum	Mean	SD
Duration (seconds)	64	900	320.51	249.610
Days since upload	30	5475	1678.20	1338.18
Number of views	87	11,456,692	400,620.93	1,246,905.016
Number of likes	0	279,000	5935.11	24,748.346
Number of comments	0	18,963	790.51	2314.006
Viewing rate	1.99	3,777,760.00	64,732.5239	318,925.9700
Reliability score	0	5	1.91	1.512
Flow	0	5	2.32	1.439
Information accuracy	0	5	2.45	1.735
Quality	0	5	2.22	1.560
Precision	0	5	2.68	1.525
Total quality score	0	20	9.66	5.568
Total content usefulness index	0	8	3.01	2.344
Video power index	0.00	3.20E + 10	294,636,327.5	2,649,686,809

related to their characteristics and quality, differences between the groups were found ($p < .05$). The videos prepared by MA were found to have statistically longer durations compared to those prepared by HP or ORG. The number of likes, number of views, number of comments, and view rates of videos prepared by MA and ORG were significantly higher compared to those prepared by HP ($p < .001$). However, there were no statistically significant differences between the two groups (videos prepared by MA and those prepared by ORG). In terms of the quality and content of the videos, those prepared by HP had significantly higher reliability scores, flow scores, and information accuracy scores compared to the videos prepared by MA and ORG ($p < .005$). In terms of quality, precision, and total quality scores, the videos prepared by HP had statistically significantly higher scores compared to those prepared by MA ($p < .005$). However, we could not find a statistically significant difference between the videos prepared by HP and those prepared by ORG ($p > .05$). Additionally, videos prepared by HP had higher VPI scores compared to the ORG ($p < .001$) (Table 4).

When evaluating the relationships between video characteristics, reliability scores, quality scores, and the content usefulness index, significant positive correlations were identified in videos of HP. Video duration exhibited positive correlations with the reliability score ($r = 0.643$, $p < .001$), flow ($r = 0.715$, $p < .001$), information accuracy ($r = 0.645$, $p < .01$), quality ($r = 0.663$, $p < .001$), precision ($r = 0.669$, $p < .001$), total quality score ($r = 0.694$, $p < .001$) and total content usefulness score ($r = 0.651$, $p < .001$). Similarly, the number of views, days since upload, number of comments, and number of likes were positively correlated with the reliability score, flow, information accuracy, quality, consistency, total quality score, and overall content usefulness score (Table 5).

Discussion

As far as we know, this is the first study which investigates the content of videos focusing on methamphetamine addiction on

YouTube™. In this study, which analyzed the presentation of information and its relationship with its sources in videos, our main findings indicate that YouTube™ is an important source of information regarding methamphetamine addiction. However, regardless of the narrators, the videos were found to be quite weak in terms of content, reliability, and quality.

Studies evaluating social media user behaviors have indicated that individuals tend to focus on the initial few results they encounter before scrolling down the page (LaValley et al., 2017). With this in mind, we included the first 204 results. Although evaluating a large number of videos is an advantage, given evidence that newer videos are less likely to attract attention (Cesur et al., 2024), this may also be a limitation. Additionally, since most sessions are shorter than 15 minutes, videos longer than 15 minutes were excluded based on this. The purpose of this exclusion is to capture user attention. However, the exclusion of these videos may have contributed to the low scores in terms of content and quality.

Social media, which provides access to social support and healthcare for people affected by methamphetamine, has great potential for use in healthcare (Ellway et al., 2019). While social media can encourage substance use, it can also help overcome the stigma associated with methamphetamine addiction, increasing the likelihood of addicts getting help. In our study, although the videos were inadequate in terms of quality, reliability, and content, we observed that they all aimed to inform people about the negative consequences of addiction. Improving the quality of the video content could help the creators achieve this objective.

Studies show that the use of online social support increases people's coping skills and provides a platform for sharing experiences (LaValley et al., 2017). The results of this study can help HP, MA, and ORG groups understand the messages conveyed in popular YouTube videos and contribute to the production of better-quality videos in all aspects.

Table 4.
Characteristic Features and Video Qualities of the Videos Based on Their Narrators

	MA	HP	ORG	<i>p</i>
Duration (seconds) (mean, SD)	434.56 ± 241.963 (b)	222.77 ± 212.862 (a)	276.16 ± 244.138 (a)	<.001
Days since upload (mean, SD)	1635.03 ± 1392.633	1606.23 ± 1184.244	1960.88 ± 1562.684	.732
Number of views (mean, SD)	472,113.81 ± 1,146,892.341 (a)	138,191.90 ± 384,353.099 (b)	863,645.40 ± 2,323,548.684 (a)	.002
Number of likes (mean, SD)	6110.52 ± 12,246.955(a)	1600.36 ± 5216.758 (b)	16,076.92 ± 56,099.988 (a)	<.001
Number of comments (mean, SD)	1194.92 ± 2823.330 (a)	199.31 ± 402.333 (b)	1230.08 ± 3258.855 (a)	<.001
Viewing rate (mean, SD)	124,431.4855 ± 484,847.1429 (a)	11,487.3490 ± 29670.35676 (b)	46,597.3261 ± 80,957.07599 (a)	.002
Reliability score (mean, SD)	1.68 ± 1.225 (a)	2.33 ± 1.767 (b)	1.48 ± 1.262 (a)	.035
Flow (mean, SD)	2.02 ± 1.123 (a)	2.79 ± 1.603 (b)	1.96 ± 1.457 (a)	.009
Information accuracy (mean, SD)	1.161 ± 1.430 (b)	3.21 ± 1.714 (a)	2.68 ± 1.60 (a)	<.001
Quality (mean, SD)	1.84 ± 1.134 (z)	2.66 ± 1.843 (x)	2.12 ± 1.509 (y)	.024
Precision (mean, SD)	2.18 ± 1.235 (z)	3.25 ± 1.567 (x)	2.56 ± 1.660 (y)	<.001
Total quality score (mean, SD)	7.61 ± 3.541 (z)	11.89 ± 6.346 (x)	9.28 ± 5.813 (y)	<.001
Total content usefulness index (mean, SD)	2.40 ± 1.664(a)	3.84 ± 2.794 (b)	2.52 ± 2.044 (a)	.022
Video power index (mean, SD)	13,6792,304.5 ± 560,588,932.2 (a)	13,414,103.28 ± 74,387,070.09 (b)	1,372,271,731 ± 6,380,831,439 (a)	<.001

Note: HP = Healthcare professional; MA = Individuals sharing their experiences/methamphetamine addicts; ORG = Organizations (media and non-governmental organizations).

a-b, there is no statistically significant difference between the groups with the same letter.

x-z, statistical difference between x and z, but, no statistically difference between x-y and y-z.

**p* < .05 was accepted to be statistically significant.

Although the reliability and total quality scores of the videos of HPs and ORG are higher than those sharing their personal experiences, the average scores are quite low in all three groups. Although there is no statistically significant difference between the total usefulness scores of the videos, the scores are still quite low. The use of social media is extremely important in providing information about many mental problems; the low quality and usefulness of methamphetamine-related videos may indicate that those who access the videos cannot find useful content about methamphetamine addiction and treatment. It is stated that inappropriate use of digital media and misinformation received are risky in terms of substance use, especially in children and young people (Romer & Moreno, 2017). It is important to develop potential strategies to intervene in these environments and increase the reliability of information presented on the internet, especially to protect adolescents and young adults from the negative effects of these products (Bright et al., 2008). Considering the complex and multifaceted effects of social media, particularly YouTube, on addiction, a careful approach is required to enhance positive impacts and minimize negative ones. Healthcare professionals should leverage the power of social media to support the dissemination of accurate information and develop strategies to prevent the spread of misinformation. Additionally, communities

and individuals should be encouraged to use social media resources consciously and responsibly in the process of combating addiction.

Research indicates that social networking platforms can significantly influence health behaviors (Moorhead et al., 2013; Naslund et al., 2020). Maher et al. (2014) conducted a comprehensive analysis of research on interventions aimed at modifying health behaviors through online social networks and found that 90% of the studies reviewed reported notable enhancements in health behaviors. This demonstrates the potential of social media to provide social support to individuals affected by methamphetamine, representing a crucial first step towards rehabilitation.

According to our results, although HPs produce more useful, high-quality, and reliable videos than methamphetamine users, their number of views, likes, and comments is lower than those of these groups. These results may be related to the fact that metrics such as view counts, likes, and comments can be misleading regarding the quality of the content.

Conversely, it may also be associated with the less interesting nature of these videos. The cooperation of HPs, voluntary institutions, media, and patient groups is important in the prevention

Table 5.
Correlations Between Video Characteristics and Reliability, Quality, and Content Usefulness Scores of Videos According to Narrators

	Duration		Days Since Upload		Number of Views		Number of Likes		Number of Comments		Viewing Rate		Video Power Index	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Reliability score	0.643**	<.001	0.276*	.031	0.656**	<.001	0.688**	<.001	0.576**	<.001	0.135	.520	0.142	.497
Flow	0.715**	<.001	0.372**	.003	0.520**	<.001	0.546**	<.001	0.474**	<.001	0.139	.506	0.191	.360
Information accuracy	0.645**	<.001	0.250	.052	0.432**	<.001	0.464**	<.001	0.312*	.014	0.063	.764	0.171	.415
Quality	0.663**	<.001	0.309*	.015	0.599**	<.001	0.625**	<.001	0.511**	<.001	0.164	.434	0.231	.266
Precision	0.669**	<.001	0.331**	.009	0.678**	<.001	0.693**	<.001	0.562**	<.001	0.077	.716	0.151	.470
Total quality score	0.694**	<.001	0.327*	.010	0.579**	<.001	0.602**	<.001	0.481**	<.001	0.125	.553	0.208	.317
Total content usefulness score	0.651**	<.001	0.193	.136	0.584**	<.001	0.611**	<.001	0.524**	<.001	0.099	.636	0.136	.515

Note: * $p < .05$.** $p < .001$.

and treatment of addiction (Alderwick et al., 2021; Kools et al., 2022). It is important to work multidisciplinary and strengthen collaborations in order to reach people with methamphetamine addiction and provide accurate information. We believe it is crucial for especially HPs to produce videos with more adequate content in this field. Creating videos about substance use and its long term results and supporting these through health policies could be particularly important for the primary prevention of addiction. Informing children and young people about addictive substances via social media, especially methamphetamine, before addiction develops could serve as a deterrent to start a substance use.

When we evaluated the relationships between video features and credibility, quality, and content usefulness, we found that longer videos were generally associated with higher credibility and overall quality scores. This finding is consistent with other studies where videos with richer content receive higher quality scores (Cesur et al., 2024; Erkin et al., 2023). In our study, we found that the number of views, number of days since upload, number of comments, and number of likes were also positively related to the reliability score, total quality score, and total content usefulness score. This data coincides with studies stating that sources that provide more reliable and accurate information attract more attention (Cesur et al., 2024; Civan Kahve et al., 2022). To improve video quality, it is recommended to include more visual content and patient experiences (Cakmak & Mantoğlu, 2021). Furthermore, to enhance the educational value of video content, it is advisable to include concise, evidence-based information that highlights the definition and key aspects of treatment (Krumm et al., 2022). Healthcare professionals creating such content should prioritize these considerations and ensure videos are grounded in scientific evidence while maintaining a reasonable duration.

As a result, the relationships between the reliability, quality, and usefulness of the content of the videos should be taken into account. Using information obtained from reliable sources will contribute to the emergence of more useful content. Similarly, as accuracy and precision improve, videos will become more reliable and useful.

Studies evaluating the quality of YouTube™ videos related to psychiatric disorders have shown that the content is variable and that some videos are likely to contain misleading information (Civan Kahve et al., 2022). While there are studies assessing the content and quality of YouTube™ videos on chronic mental illnesses such as schizophrenia and bipolar affective disorder (Altunsoy, 2023; Civan Kahve et al., 2022), there are no studies in the literature evaluating videos related to addiction despite its increasing prevalence and significance as a health issue. Therefore, we believe our study is important in this area.

This study has some limitations. Firstly, the sample is limited to videos on YouTube™, potentially overlooking content on other social media platforms. Secondly, both evaluators were psychiatrists. The evaluation of videos may be subjective, and the biases of the evaluators could influence the results. Additionally, given that videos can change and be updated over time, the findings of the study may only reflect a specific time period. Furthermore, metrics such as view counts and likes may be misleading regarding the quality of the content, as popularity does not necessarily guarantee accuracy or educational value. Lastly, the validity

and reliability of the evaluation criteria used in the study may be limited, affecting the generalizability of the results. The usefulness of the video contents was evaluated with a 10-item index created by the researchers, and the lack of reliability and validity scores of this index is an important limitation. The fact that only English videos were evaluated may invalidate generalizations, particularly in the context of Türkiye. However, to the best of our knowledge, this study represents the first attempt to assess videos concerning methamphetamine addiction on YouTube.

Findings show that videos about methamphetamine addiction have low levels of reliability and quality, and the content is largely useless. Video engagement rates are linked to the quality and reliability of the video content, underscoring the importance of these aspects for viewers. For this reason, it is important for both HPs and those sharing personal experiences to pay attention to information flow, consistency, and visual elements when creating content and to enrich the content with up-to-date information. This approach will contribute to correctly informing patients and creating more interaction. This will contribute positively to the process of those seeking information and help regarding methamphetamine addiction and treatment.

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ORIGINAL ARTICLE

Prevalence of Substance Use and Its Predictors among Malaysian School-Going Adolescents at Drug-Based Hotspot Areas

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Main Points

- Examining substance use among adolescents not only deepens our understanding of the issue but also directs tangible interventions and influences policies that strive to prevent and tackle substance use in this susceptible demographic.
- The results of this study can be included in the secondary school curriculum to enlighten adolescents about the hazards and repercussions of substance use. This equips them with the knowledge necessary to make well-informed decisions, thus aiding authorities in mitigating the prevalence of substance use among adolescents.
- Additionally, this study recognizes the influence of family dynamics on adolescents' substance use and advocates for the integration of family and community-based therapy to target underlying problems.
- Identification of risk factors could help pinpoint specific factors associated with adolescent substance use, which helps in the development of early prevention programs.
- Policymakers can utilize the research findings to inform law enforcement measures, specifically targeting locations and demographics with elevated rates of substance use among adolescents. This can be achieved through the implementation of focused intervention programs.

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Abstract

The adolescents of a country are its most valuable asset. Substance abuse is preventable in comparison to other significant adolescent health concerns listed by the World Health Organization, such as road traffic accidents, drowning, and violence. Unfortunately, substance abuse can damage adolescents and possibly halt the nation's progress, particularly in places where drugs are easily accessible and cultural norms are shifting. Therefore, we conducted a cross-sectional survey of 3382 Malaysian school-going adolescents aged 13 – 19 to evaluate substance use and its determinants in drug-based hotspot areas. The Alcohol Smoking and Substance Involvement Screening Test measured substance use, while the Youth Self-Report, Self-Problem Test, and Self-Reporting Coping Scale plus Knowledge and Attitudes on Substance Use measured the study's predictors via logistic regression models. Three in ten school-going adolescents are using substance, with adolescents' main substance being tobacco user, whereas polysubstance are tobacco and drugs user. Tobacco has always been the dominant substance for both current and ever users. The risk factor for an individual was male and rule-breaking behavior, followed by the domain of family with the loss of either parent, and finally the community of race and East Malaysian. Adolescents in communities under 10 years with high depression/anxiety, withdrawal, and academic issues reduced substance use by 35%, 8%, 5%, and 2%, respectively. Being a male with a loss of family pillars and a bigger image of Indigenous East-Malaysian adolescents is at risk. Hence, the key solution is a culturally appropriate, gender- and family-based intervention is necessary for masculine adolescents from broken families.

Keywords: Alcohol, drug, drug-infested regions, factors, occurrence, teenager, tobacco

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Introduction

Adolescence connects childhood and adulthood from 10 to 19 years. This period lays the foundation for an individual's health. The remarkable physical, mental, and social development of adolescents influences their mood, reasoning, and decision-making (Jaworska & MacQueen, 2015). Therefore, the World Health Organization (WHO) emphasizes that adolescents are at increased risk for death, sickness, and injury due to poor lifestyle choices, including food, exercise, substance use, and sexual behaviors. Apart from all the major adolescent health hazards on WHO's lists, substance use is preventable when compared to road traffic accidents, drowning, and violence (WHO, 2017).

United Nations Children's Fund (2022a) reports that there are 1.3 billion adolescents worldwide, representing 16% of the global population, but not all have access to formal education. In 2021, only two out of three lower secondary school pupils and one out of two upper secondary school children attended either upper secondary school or further education (United Nations Children's Fund, 2022b). Schools commonly integrate substance use prevention programs into their curriculum or implement them as stand-alone projects to educate students about the dangers of substance use. These programs educate and provide awareness to adolescents about substance use and the consequences of use in terms of physical and mental health, academic achievement, relationships, and well-being. Usually, these programs include addiction, stress management, coping strategies, healthy lifestyle alternatives, peer pressure, and healthy decision-making (Alarcó-Rosales et al., 2021).

Even with such a prevention program, the incidence was noted to be high, with nearly one in ten adolescents use substance from the year 2016 to 2018, with males at risk (World Health Organization, 2023). Previous research has found a prevalence range of 19.4 – 47% among school-going adolescents (Mavura et al., 2022; Mokwena & Setshego, 2021; Umukoro et al., 2021), which proves that substance use among school-going adolescents is a global problem. However, those studies do not focus on the drug hotspot area, which may influence substance use.

When there is a high concentration of drug-related activities like trafficking, drug use, and crimes that region is said to be a drug hotspot area (Lessler et al., 2017). These communities are characterized by drug traffickers, unrestricted drug markets, and increased substance use. The incidence of substance use in drug hotspot areas has been steadily rising because these areas often have a confluence of risk factors for substance use, including social milieu, stress, availability, lack of resources, and peer pressure, making the population more susceptible to risky behavior, especially adolescents who are still developing.

Risk factors for substance use vary by country, but they typically fall into one of three categories: individual, family, or community. The predictors for individuals are pocket money, academic achievement (Rakić et al., 2014), sport, behavioral issues, and mental health (Umukoro et al., 2021), followed by familial or parental status (Mokwena & Setshego, 2021), and lastly, community factors of peer pressure and media (Mavura et al., 2022). Unfortunately, none of these studies focus on school-going adolescents in drug hotspot areas.

Substance use is a worldwide problem. Malaysia has 4.8 million adolescents, representing 14.7% of its 32 million inhabitants (DOSM, 2019), of whom 80% regardless of gender are having access to education (United Nations Children's Fund, 2021). Studies conducted in Malaysia focus more on individual substance use (Hong & Peltzer, 2019; Jane Ling et al., 2022; Pei Pei et al., 2021) than on substance use as a whole. However, only two studies evaluated substance use as a whole: one reported on a type of substance-user of 17.2% monosubstance and 5.1% polysubstance use (Ismail et al., 2022), plus a status of substance-user of 5.5% ever and 3.5% current users (Rodzlan Hasani et al., 2021). There is a limitation in both studies where the Ismail et al. (2022) study population were youth aged 15 – 40 years old, and Rodzlan Hasani et al. (2021) studied adolescents aged 13 – 17 years old, which is not inclusive of the adolescent age range of 10 – 19 years old specifically.

Further scoped, only one study has confirmed the significance of individual, family, and community factors in substance use (Rodzlan Hasani et al., 2021). Each of these elements has been broken down into its component parts: the individual (boys between the ages of 13 and 15 with discipline problems and mental health issues), the family (issues of parent connection, bonding, and ethnicity), and the community (peer pressure and bullying in adolescents), but the drug hotspot area has not been the focus of this research.

National Anti-Drug Agency (NADA) of Malaysia has coined the term "Hotspot Areas," which refers to geographical regions where a greater-than-average amount of social problems have been observed, such as social diversion and drug addiction-related criminality. In 2020, NADA re-demarcated the entire country, identifying 155 hotspot regions with the aim of reducing substance use by 2025 (NADA, 2023).

Substance use is linked to dependence and other issues, and younger people are more affected by it than older people (Ismail et al., 2022). Adolescents are the nation's future; therefore, investing in them is essential for its progress. This is often preventable or treatable. Consequently, this research aims to identify the actual scope of the issue and focus on areas that require intervention before it becomes the norm throughout the nation. Hence, the study's goal is to determine the prevalence and predictors of substance use among school-going adolescents in a drug-based hotspot area in Malaysia.

Material and Methods

Study Design, Area, and Population

This study was a secondary data analysis from the Study of Social Issues of Youths in Malaysia, which was collected in 2020 – 2023. We conducted a cross-sectional survey among Malaysian school-going adolescents aged 13 – 19. This study is representative of the entire Malaysian population, encompassing both the eastern and western regions. A total of eight states: Kedah, Penang, Kelantan, Terengganu, Selangor, Johor, Sabah, and Sarawak were surveyed in this study. We used the drug hotspot area demarcation from NADA to determine the district in each state (NADA, 2023), as illustrated in Figure 1.

Data Collection

Self-administered questionnaires were employed. Based on the sample inclusion and exclusion criteria in Figure 2, the

researcher sought potential participants. All researchers and enumerators were properly trained and adhered to the government's coronavirus disease 2019 (COVID-19) standard operating procedures for data collection in academic institutions. The adolescent was guided through the questionnaire by the teacher during the lockdown in response to the COVID-19 pandemic.

Figure 2 illustrates the use of multistage stratified cluster sampling to ensure sample representativeness. A single proportion method was used to determine prevalence, adjusting for target population size, design effect, and 30% non-response. According to Mokwena and Setshego (2021), the minimum sample size for 47% prevalence was 1096 respondents. A total of 3382 adolescents from 77 chosen schools in eight Malaysian states and drug-based hotspot areas voluntarily answered the questionnaire with written informed consent from their parents or legal guardians.

Study Tool

The questionnaire has several sections, namely Section A: Sociodemographic, Section B: Youth Self-Report (YSR), Section C: Self-Problem Test, Section D: Self-Reporting Coping Scale (SRCS), Section E: Knowledge and Attitudes on Substance Use, Section F: Drug-use Information, and Section G: Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST). However, because the focus of this study was on overall substance use rather than drugs, we did not include Section F in the data analysis. This assessment of adolescent substance use was developed by utilizing only a subset of the original questionnaire, which was translated into a Malay version. The objective was to ensure that the assessment could be completed in 30 minutes in order to optimize the students' study time and prevent the adolescents from becoming fatigued. Section A has 13 questions concerning age, gender, ethnicity, race, living and school environment, parents' relationship, occupation, and income. In Malaysia, there are three dominant races: Malay, Chinese, Indian, and others. The others are from East Malaysia, specifically Sarawakian and Sabahan. The income groups in Malaysia are categorized as T20, M40, and B40. B40 refers to the lowest 40% of individuals in terms of income, M40 represents the middle 40%, and T20 represents the highest 20%.

Youth Self-Report has 53 items that cover two domains: internal and external, and four subdomains: withdrawn, anxious/depressed, aggressive, and rule-breaking. The YSR has been translated into Malay by Nik Jaafar et al. (2013), and the Cronbach α values for the three domains (internalizing, externalizing, and social issues) range from 0.85 to 0.90. Higher scores indicate adolescent emotional problems.

Section C contains the Mooney Problem Checklist 1950 Revisions of self-problem questions. This survey has 60 questions examining financial, self-esteem, family, spiritual, educational, and employment goals. This study employs a validated and translated Malay version of the questionnaire, originally developed by Rozmi et al. (2017) with a Cronbach α value of 0.904. Adolescents with higher scores signify greater problems faced by the adolescent in the respective aspect.

Problem-solving is one of the five-scale ideas in the SRCS to measure adolescent coping techniques. This study solely examines academic and peer coping skills using problem-solving coping methods among adolescents with eight items in each domain. According to Quynh and Hua (2021), a higher score on the questionnaire suggests a greater tendency to use substances as a coping mechanism. Additionally, Hamsan (2009) reported a Cronbach's α value of 0.78 for this questionnaire.

Ireland's drug knowledge, attitudes, and beliefs were measured by Audrey Bryan's KAB exam. We used the Malay-translated version of Al-Zurfi et al. (2016) for this survey, which consists of 35 items that solely examine knowledge and attitude on substance use. Higher ratings indicate better knowledge and attitudes about consequences, prevalence, treatment, prevention, policy, and community substance use. The Cronbach alpha coefficients for the knowledge and attitude surveys were 0.687 and 0.681, respectively (Nasir et al., 2016).

The outcome of this study was examined using the ASSIST version 3.0 questionnaire. The objective of ASSIST is to promptly and precisely detect substance use problems during the past 3 months (WHO, 2010). The dependent variable of this study is substance use, which means that any "yes" to either one or more substances of drug, tobacco, or alcohol is considered substance use regardless

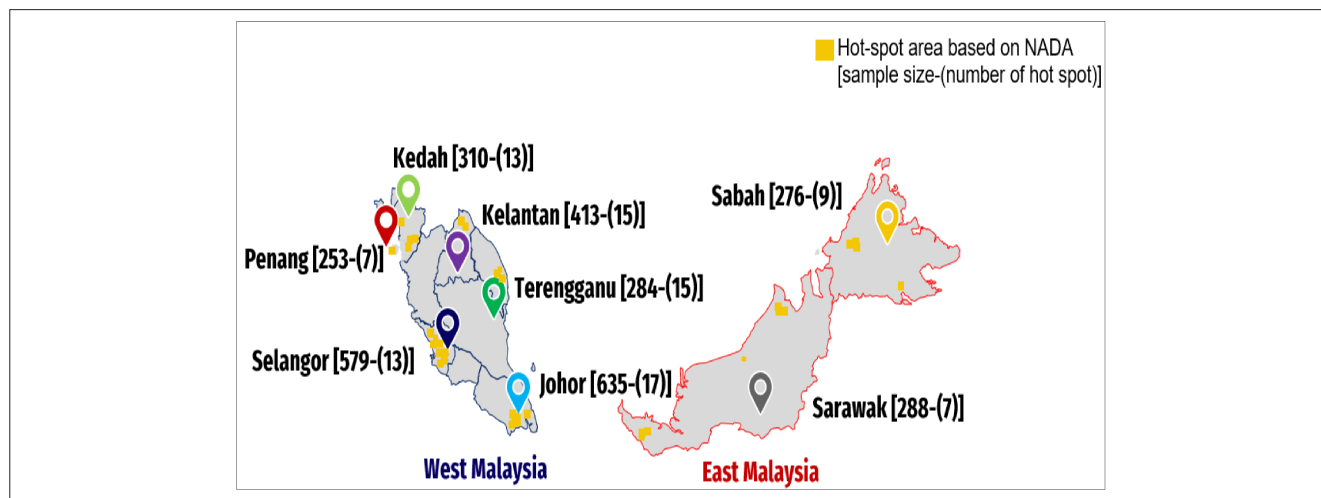


Figure 1. Number of Samples Taken According to the Selected State in Malaysia (n = 3038).

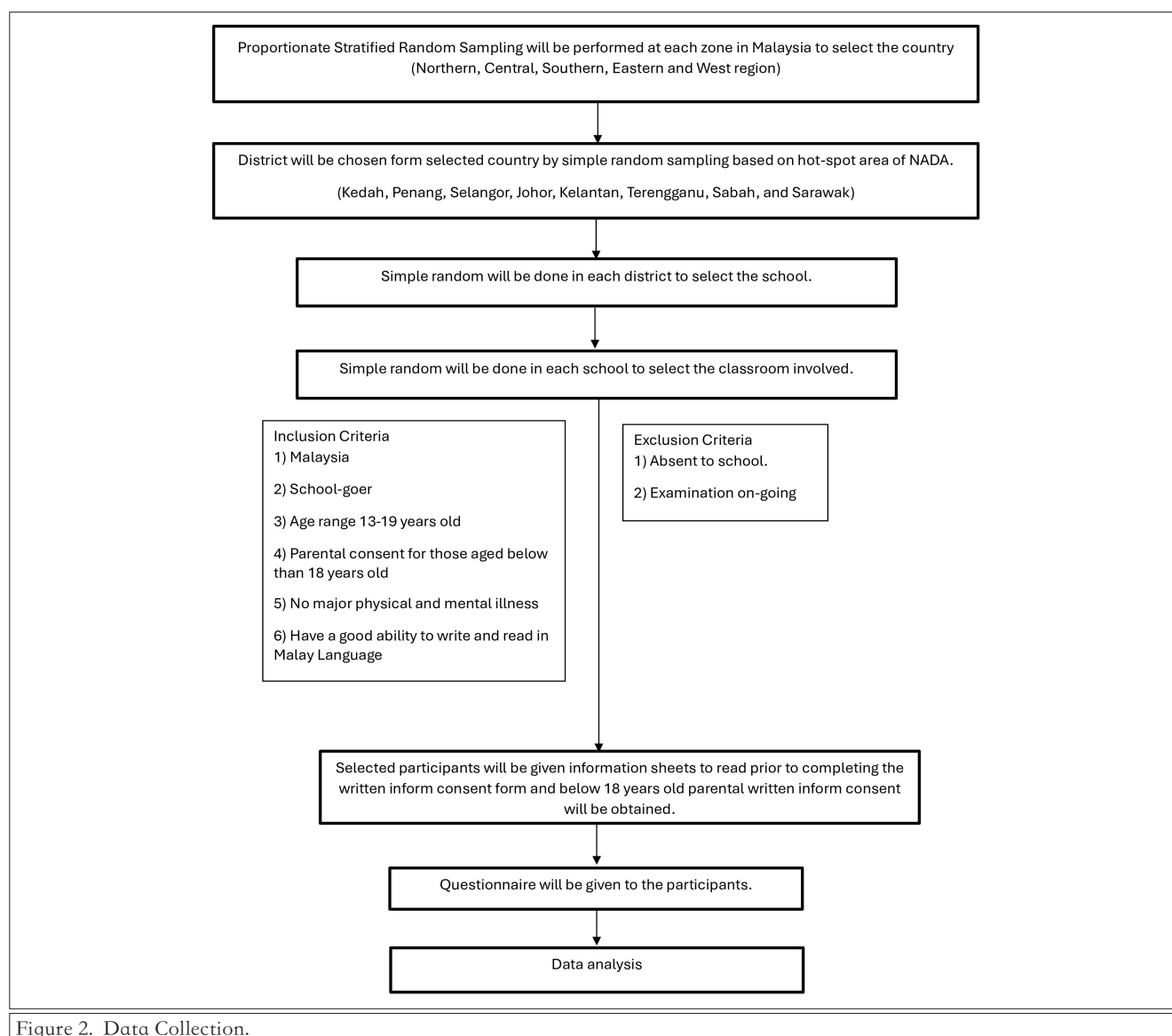


Figure 2. Data Collection.

of the duration consumed, while a non-user is a respondent who has never consumed any substance in their lifetime. We classified respondents who replied “yes” for substance use and last use in the past 3 months as current users, while those who replied “no” for last use in the past 3 months were considered ever users. Polysubstance users are those who tested for more than one substance, while monosubstance users are those who checked for only one.

A pilot study was conducted with 50 respondents from Selangor, which was separate from this study participants, and reliability analysis showed satisfactory reliability, with a Cronbach’s α for YSR = 0.934, Self-Problem Test = 0.891, SRCS = 0.902, and knowledge and attitude = 0.884.

Data Processing and Analysis

Data were analyzed using SPSS software version 27 (IBM SPSS Corp.; Armonk, NY, USA). We extracted data on substance use and selected variables from the raw data, presenting them as frequencies and proportions for categorical variables, and as mean and standard deviation for continuous variables. We analyzed the associated predictors for substance use using simple

logistic regression (SLR) and multiple logistic regression (MLR) analyses.

Ethical Approval This study was approved by the Ethics Committee of the Secretariat of Research Ethics, Universiti Kebangsaan Malaysia, Faculty of Medicine, Cheras, Kuala Lumpur, Malaysia on 23rd March 2020 (Reference no: UKM PPI/111/8/JEP-2020-174(2)). Approval from the Education Planning and Research Division, Ministry of Education Malaysia, state, and district education offices was obtained before data collection.

Results

Participant Socio-Demographic Characteristics

As shown in Table 1, the total number of respondents was 3382, and most of the participants were from West Malaysia (73.2%). There is an equal proportion of urban (51.7%) and rural (48.3%) participants, as well as mothers of adolescents who are working (50.3%) and unemployed (49.7%). In the meantime, more than half of the respondents are male (71.7%), Malay (74.5%), live on landed property (81.4%), have lived in a community for more

than or equal to 10 years (69.6%), have attended school (94.0%), have no history of disciplinary offenses (95.3%), are parents who live together (80.1%), are employed fathers (87.9%), and have a family income of B40 (86.0%).

Adolescent Social and Behavioral Characteristics

According to YSR, 56.4% of adolescents have internal issues with a mean score of 12.3 (6.86), and the subdomain of anxious/

depressed scores has the highest mean of 7.1 (4.64). In the Self-Problem Test, the average score for the job goal is 36.0 (7.55), with the financial goal coming in second at 34.7 (5.54) and the religious/morality goal at 34.0 (7.29). Next, the SRCS reveals that most adolescents have a better coping skill in dealing with peers 28.4 (7.40) compared to academics. Similarly, when it comes to knowledge and attitude on substance use, adolescents have the highest mean score of 90.3 (22.31), surpassing the knowledge of school-going adolescents, as Table 2 illustrates.

Self-Report Prevalence of Substance Use

The prevalence of substance use among school-going adolescents is 33% overall prevalence of ever and current prevalence of substance use was 12% and 21%, respectively. While the monosubstance and polysubstance use of current users are 16% and 5%, respectively, as shown in Figure 3.

Status of substance users is shown in Table 3. Among those who reported currently using substances, the most commonly reported were tobacco (19.0%) and alcohol (3.4%), followed by Kratom (2.0%), hallucinogens (1.2%), and amphetamine (0.6%). While for ever using substances were tobacco (28.5%) and alcohol (8.0%), followed by Kratom (5.8%), hallucinogens (3.3%), and cannabis (1.9%).

Type of substance use is explained in Figure 4. The prevalence of polysubstance use is as follows: tobacco and drug 2.9%, followed by tobacco and alcohol 2.1%, alcohol and drug 0.7%, and finally tobacco, alcohol, and drug 0.6%. Meanwhile, for monosubstance use, the prevalence is as follows: tobacco 19.0%, drug 3.9%, and alcohol 3.4%.

Analysis for Factors Associated with Substance Use

The binary logistic regression model in Table 4 showed that being a male has a six-time risk (OR = 6.62) for the adolescent to be a

Table 1.

Sociodemographic Characteristics of School-Going Adolescents in Malaysia (n = 3382)

Variable	n (%)
State	
West Malaysia	2474 (73.2)
East Malaysia	908 (26.8)
Locality	
Rural	1747 (51.7)
Urban	1635 (48.3)
Age (years)	
Mean (SD)	15.4 (2.28)
Gender	
Male	2425 (71.7)
Female	957 (28.3)
Race	
Malay	2519 (74.5)
Chinese	261 (7.7)
Indian	176 (5.2)
Others*	426 (12.6)
Type of house	
Landed property	2752 (81.4)
Shared property	630 (18.6)
Years living in that community	
<10 years	1027 (30.4)
≥10 years	2355 (69.6)
Like school	
Yes	3180 (94.0)
No	202 (6.0)
Change school due to disciplinary offences	
Yes	159 (4.7)
No	3223 (95.3)
Parental relationship status	
Living together	2709 (80.1)
Divorce	324 (9.6)
Not living together	93 (2.7)
One of them has died	256 (7.6)
Father's job	
Employed	2974 (87.9)
Unemployed	408 (12.1)
Mother's job	
Employed	1702 (50.3)
Unemployed	1680 (49.7)
Income classification	
B40	2909 (86.0)
M40	384 (11.4)
T20	89 (2.6)

Note: *Sarawakian (Kadazan-dusun) (Kadazan-Dusun) and Sabahan (Iban).

Table 2.

Social and Behavioral Characteristics of School-Going Adolescent in Malaysia (n = 3382)

Variable	Mean (SD)
Youth Self-Report	
Internal	12.3 (6.86)
Withdrawn	5.2 (2.96)
Anxious/depressed	7.1 (4.64)
External	11.8 (8.31)
Rule-breaking behavior	4.7 (3.66)
Aggressive	7.2 (5.40)
Self-Problem Test	
Financial	34.7 (5.54)
Self-esteem	33.2 (6.45)
Family	28.4 (4.94)
Religious/morality	34.0 (7.29)
Job goal	36.0 (7.55)
Academic	33.0 (7.39)
Self-Reporting Coping Scale	
Coping skills related to academic problems	27.7 (7.01)
Coping skills related to peer problem	28.4 (7.40)
Knowledge on substance use	63.7 (15.06)
Attitudes on substance use	90.3 (22.31)

Note: SD = Standard deviation.

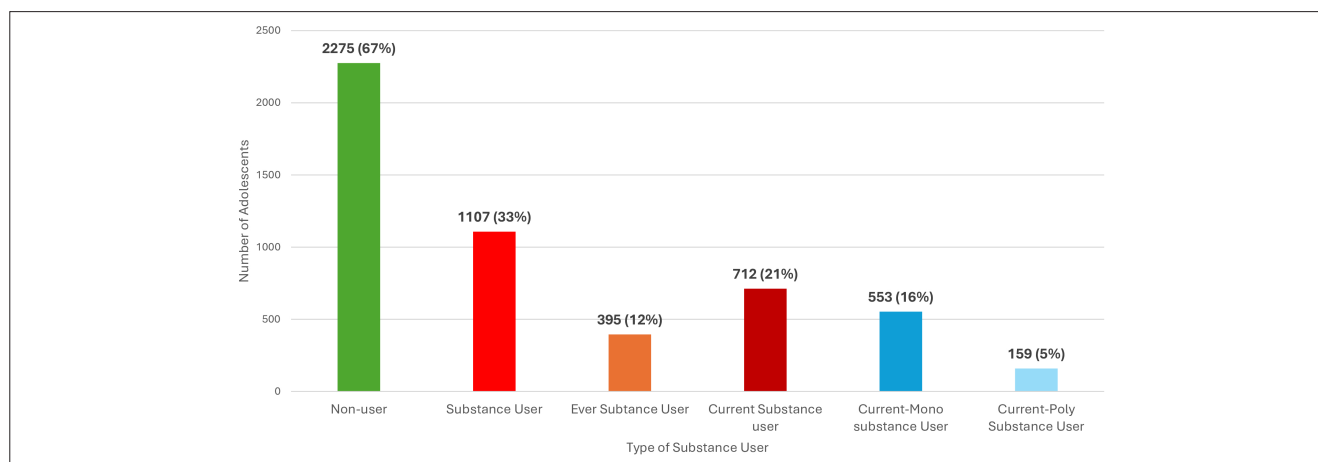


Figure 3. Self-Reported Prevalence of Substance Uses Among School-Going Adolescents in Malaysia (n = 3382).

substance user. Adolescents with rule-breaking behavior, other race such as Sarawakian and Sabahan, the loss of either parent, and from East Malaysia have odds of 1.23, 1.39, 1.67, and 1.92 respectively, to be substance users.

The adolescents' social and behavioral traits were evaluated with the help of four validated questionnaires; however, only the YSR (<0.001 and 0.002) and the Self-Problem Test (0.032) were found to be statistically significant.

However, there are more protective factors noted, which are adolescents living in community for less than 10 years, withdrawal, depression/anxiety, and academic problems. Interestingly, adolescents living in a community less than 10 years were noted to reduce the risk of substance use by 35%, while withdrawn by 8%, depression/anxiety reduced it by 4% and academic problems reduced it by 2%.

The interaction between variable gender with academic problems was noted to be significant (0.011). Female adolescents with high academic mean scores have reduced the risk by 6%.

Meanwhile, males with higher mean scores for academic problems have increased the risk of substance use by 6% among adolescents.

The Pseudo R² value obtained in this study was 0.292, indicating that the variable under investigation accounts for only 29.2% of the total factors associated with substance use.

Discussion

Adolescent substance use is a global issue. Understanding adolescent substance use patterns is necessary to design effective prevention, intervention, and harm reduction strategies. This study found that 33% are substance users, which the prevalence is higher than earlier research, ranged from 19.4% to 22.3% (Rodzlan Hasani et al., 2021; Umukoro et al., 2021). Identifying a pattern is challenging because those studies are not drug-based hotspot areas like this one. Substance availability in drug hotspot areas and adolescents' vulnerability (Heyes & Hiu, 2016) may explain the epidemic's expansion. Furthermore, a recent review has reinforced this statement, suggesting that

Table 3.

Self-Reported Prevalence of Substance Use Among School-Going Adolescents in Malaysia (n = 3382)

Variable Type of Substance	Status of Substance User			
	Current* n (%)	CI (Minimum/Maximum)	Ever** n (%)	CI (Minimum/Maximum)
Tobacco ¹	643 (19.0)	17.7/20.4	964 (28.5)	27.0/30.1
Alcohol ²	116 (3.4)	2.9/4.1	272 (8.0)	7.1/9.0
Drug				
Cannabis ³	18 (0.5)	0.3/0.8	63 (1.9)	1.4/2.4
Cocaine ⁴	16 (0.5)	0.3/0.8	28 (0.8)	0.6/1.2
Amphetamine ⁵	19 (0.6)	0.3/0.9	29 (0.9)	0.6/1.2
Inhalant ⁶	14 (0.4)	0.2/0.7	22 (0.7)	0.4/1.0
Sedative ⁷	16 (0.5)	0.3/0.8	32 (0.9)	0.6/1.3
Hallucinogen ⁸	41 (1.2)	0.9/1.6	113 (3.3)	2.8/4.0
Opioid ⁹	9 (0.3)	0.1/0.5	20 (0.6)	0.4/0.9
Kratom ¹⁰	68 (2.0)	1.6/2.5	195 (5.8)	5.0/6.6

Note: *Current substance use is who answered "Yes" within 3 months preceding the survey. **Ever substance use is who answered "Yes" for lifetime use and current use within 3 months preceding the survey.

¹Cigarette, Chewing Tobacco, Cigars, etc. ²Beers, Wine, Liquor, etc. ³Cannabis, Pot, Grass, Hash, etc. ⁴Coke, Crack, etc. ⁵Speed, Meth, Ecstasy, etc. ⁶Nitrous, Glue, Gasoline, Paint Thinner, etc. ⁷Diazepam, Alprazolam, Midazolam and Others. ⁸LSD, Acid, Mushrooms, Thrips, Ketamine, etc. ⁹Heroin, Morphine, Methadone, Buprenorphine, Codeine, and Others. ¹⁰Kratom.

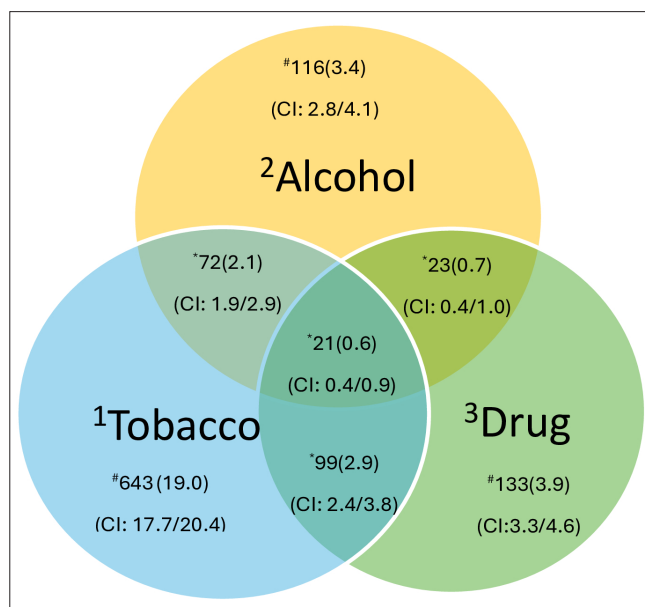


Figure 4. Self-Reported Prevalence of Types of Substance Uses Among School-Going Adolescents in Malaysia (n = 1107), n (%).

more drug hotspot areas tend to attract a higher number of users (Ndayongeje et al., 2018).

One study in South Africa, based on data collected in rural areas, reveals a higher prevalence of 47% (Mokwena & Setshego, 2021), despite the fact that many others show a far lower incidence. South Africa is a lower-middle-income country (ESARO, 2023) according to GDP, which means that the government may have fewer resources available to cope with addiction prevention initiatives and medical care that is still subpar (Maphumulo & Bhengu, 2019). Health care facilities in Malaysia are better suited to the needs of adolescents (Ministry of Health, 2009) than those in South Africa, which focus more on serving the overall community than on providing services to any one demographic in particular. A lack of interventions and effective prevention may contribute to the high rates of substance use in South Africa.

In terms of substance status, both current and ever-users use tobacco the most, which is similar to a previous study in Malaysia (Ismail et al., 2022). On the other hand, the most common mono-substance use among adolescents is tobacco, which is similar to the Malaysian study (Rodzlan Hasani et al., 2021), but in countries like Serbia (Rakić Dušica et al., 2014), Tanzania (Mavura et al., 2022), and South Africa (Mokwena & Setshego, 2021), alcohol is the most common. Adolescent substance use differs by nation due to cultures that promotes it. Most Western societies, like Africa have long accepted alcohol consumption as an integral part of adulthood, social events, and celebrations (Birhanu et al., 2014). In Malaysia, parents' attitudes and actions play a significant role in encouraging young people to try tobacco for the first time, in addition to cultural influences (Nawi et al., 2021).

Adolescents engage in polysubstance use, consuming both tobacco and drugs. Although the results of this study differ from a previous Malaysian study (Rodzlan Hasani et al., 2021) on tobacco and alcohol, they are consistent with data collected in drug-based hotspot areas, where drug availability and use are

significantly higher than in the general population. Smoking and drug use are socially accepted habits taught by parents and older siblings in the hotspot area, plus the thrill of experimenting with new things among adolescents, making them common among all users (Mavura et al., 2022).

Individual, familial, and community elements influenced substance use among adolescents (Nawi et al., 2021). The current study found that individual factors of adolescence are gender, withdrawal, depression/anxiety, rule-breaking behavior, and academic problems, while for family are parental status and community, which consist of race, years spent in the community, and state. These are the significant features that influence substance intake among school-going adolescents in Malaysia.

Individual gender factors increased by six for adolescent boys, consistent with previous studies (Mokwena & Setshego, 2021; Rodzlan Hasani et al., 2021). Sensation-seeking conduct is more prevalent among males, who actively seek out fresh and thrilling experiences (Nawi et al., 2021). The high they get from using substances may entice adolescent boys to experiment with them more than girls. Except for one study from Tanzania, females are at a higher risk of substance use because the sample size is more female than male (Mavura et al., 2022).

Next, rule-breakers were more likely to use substances, according to recent research (Mokwena & Setshego, 2021). Adolescents who transgress the rules may have an increased need for novelty and excitement (Nawi et al., 2021). The theory of personality, which views substance use as a type of individualism or nonconformity that allows users to express their unique identities and challenge societal norms, also supports the idea that adolescents who transgress the rules may have an increased need for novelty and excitement (Lee & Yeager, 2020).

The individual domains such as high scores in withdrawal, depression/anxiety, and academic issues protect school-going adolescents from substance use. On the other hand, adolescents who exhibit withdrawn behavior may tend to pursue solo activities or maintain a close-knit group of friends. They have developed strong coping mechanisms and emotional regulation abilities to manage stressful situations and negative emotions without resorting to substance use (Nawi et al., 2021).

Adolescents with high depression/anxiety scores and academic problems serve as buffers against substance use, which challenges the results from the previous study (Umukoro et al., 2021). Malaysia has implemented adolescent-friendly healthcare services (UNICEF, 2022c), recognizing the specific needs and concerns of adolescents with mental health and substance use issues (Ministry of Health, 2014). The school health team is required to conduct adolescent health status screenings, through which adolescents with problems receive appropriate treatment and intervention for their challenges (Ministry of Health, 2009). Effective treatment can address the underlying issues and provide healthier coping mechanisms, reducing the need for substance use.

This study's interaction analysis shows that girls with higher academic scores have a lower chance of substance use, but unfortunately, boys with underlying academic problems have an increased risk of being substance users. Most prior research has

Table 4.
Analysis for Factors Associated with Current Substance Use (n = 3382)

Variable	Yes N (%)	No N (%)	SLR		MLR	
			Crude OR (95% CI)	p	Adjusted OR* (95% CI)	p
State ^c					–	
West Malaysia	411 (16.6)	2063 (83.4)	1			–
East Malaysia	301 (33.2)	607 (66.8)	2.49 (2.091, 2.962)	<.001	1.921 (1.525, 2.421)	<.001
Locality ^c						
Rural	416 (23.8)	1331 (76.2)	1	<.001	–	–
Urban	296 (18.1)	1339 (81.9)	1.41 (1.196, 1.671)		–	–
Age (years) mean (SD) ^a	15.65 (1.81)	15.26 (2.388)	1.19 (1.101, 1.282)	<.001	–	–
Gender ^a						
Female	33 (3.5)	924 (96.5)	1		–	–
Male	679 (28.0)	1746 (72.0)	10.89 (7.609, 15.582)	<.001	6.621 (4.566, 9.601)	<.001
Race ^c						
Malay	479 (19.0)	2040 (81.0)	1			
Chinese	48 (18.4)	213 (81.6)	0.834 (0.603, 1.154)	.273	–	–
Indian	34 (19.3)	142 (80.7)	0.893 (0.608, 1.310)	.562	–	–
Others	151 (35.5)	275 (64.5)	2.344 (1.884, 2.917)	<.001	1.378 (1.029, 1.847)	.032
Type of house ^b						
Shared property	125 (19.8)	505 (80.2)	1		–	–
Landed property	587 (21.3)	2165 (78.7)	0.91 (0.736, 1.133)	.408	–	–
Years living in that community ^c						
More than or equal to 10 years	545 (23.1)	1810 (76.9)	1		–	–
Less than 10 years	167 (16.3)	860 (83.7)	0.645 (0.533, 0.781)	<.001	0.649 (0.524, 0.803)	<.001
Like school ^a						
Yes	661 (20.79)	2519 (79.21)	1			
No	51 (25.25)	151 (74.75)	1.29 (0.926, 1.788)	.132	–	–
Change school due to disciplinary offences ^a						
Yes	49 (30.8)	110 (69.2)	1			
No	663 (20.6)	2560 (79.4)	0.58 (0.411, 0.823)	.002	–	–
Parental relationship status ^b						
Living together	535 (19.8)	2174 (80.2)	1		–	–
Divorce	82 (25.3)	242 (74.7)	1.38 (1.054, 1.800)	.019	–	–
Not living together	23 (24.7)	70 (75.3)	1.36 (0.826, 2.159)	.238	–	–
One of them has died	72 (28.1)	184 (71.9)	1.59 (1.192, 2.122)	.002	1.668 (1.206, 2.306)	0.002
Father's job ^b						
Unemployed	142 (21.1)	531 (78.9)	1		–	–
Employed	570 (21.0)	2139 (79.0)	0.10 (0.810, 1.226)	.973	–	–
Mother's job ^b						
Unemployed	358 (20.23)	1412 (79.99)	1		–	–
Employed	354 (21.96)	1258 (78.04)	1.11 (0.941, 1.309)	.217	–	–
Income classification ^b						
T20	20 (22.5)	69 (75.5)	1			
M40	70 (18.2)	314 (81.8)	0.82(0.622, 1.075)	.324	–	–
B40	622 (21.4)	2287 (78.6)	1.16(0.905, 1.480)	.390	–	–
Youth Self-Report						
Internal	11.424 (6.426)	12.503 (6.956)	0.976 (0.964, 0.989)	<.001		
Withdrawn ^a	4.736 (2.819)	5.259 (2.988)	0.94 (0.914, 0.968)	<.001	0.918 (0.882, 0.956)	<.001
Depression/anxious ^a	6.688 (4.361)	7.244 (4.711)	0.97 (0.956, 0.992)	<.005	0.956 (0.929, 0.984)	.002
External	15.666 (9.358)	10.815 (7.689)	1.067 (1.057, 1.078)	<.001	–	–
Aggressive ^a	8.826 (5.852)	6.728 (5.184)	1.21 (1.181, 1.236)	<.001	–	–
Rule-breaking behavior ^a	6.840 (4.245)	4.087 (3.255)	1.07 (1.054, 1.086)	<.001	1.234 (1.200, 1.269)	<.001

(Continued)

Table 4.*Analysis for Factors Associated with Current Substance Use (n = 3382) (Continued)*

Variable	Yes N (%)	No N (%)	SLR		MLR	
			Crude OR (95% CI)	p	Adjusted OR* (95% CI)	p
Self-Problem Test						
Financial ^b	34.813 (5.380)	34.616 (5.588)	1.01 (0.991, 1.022)	.398	–	–
Self-esteem ^a	32.597 (6.547)	33.362 (6.411)	0.98 (0.970, 0.995)	.005	–	–
Family ^b	28.368 (5.087)	28.464 (4.897)	1.00 (0.980, 1.013)	.644	–	–
Religious/morality ^c	33.195 (7.568)	34.182 (7.201)	0.98 (0.971, 0.993)	<.001	–	–
Job goal ^a	35.517 (7.777)	36.103 (7.485)	0.99 (0.979, 1.001)	.007	–	–
Academic ^a	31.740 (7.637)	33.356 (7.285)	0.97 (0.961, 0.982)	<.001	0.987 (0.974, 0.999)	.032
Self-Reporting Coping Scale (SRCS)	26.805 (7.163)	27.882 (6.954)	0.98 (0.968, 0.990)	<.001	–	–
Coping skills related to academic problems ^a	27.579 (7.311)	28.638 (7.405)	0.98 (0.971, 0.992)	<.001	–	–
Coping skills related to peer problems ^a						
Knowledge on materials use ^a	64.260 (15.474)	63.538 (14.949)	1.00 (0.998, 1.009)	.256	–	–
Attitudes on materials use ^a	90.142 (22.428)	90.336 (22.283)	1.00 (0.996, 1.003)	.836	–	–
Interaction						
Gender* Academic [#]					0.986 (0.975, 0.997)	.011
Male* Academic					1.060 (1.048, 1.072)	<.001
Female* Academic					0.944 (0.933, 0.955)	<.001

Note: Hosmer-Lemeshow test ($p = .0613$), the model of this study was noted to be fit and classified as a good model with a score of 85.48% plus no outlier noted. MLR = Multiple logistic regression; OR = Odds ratio; SLR = Simple logistic regression.

*Forward LR Multiple Logistic Regression Model was applied. Multicollinearity was checked and not found. [#]Component from Self-Problem Test. Significant p -value < .05. ^aIndividual domain. ^bFamily domain.

^cCommunity domain.

overlooked the potential for an interaction between variables. However, the theory of motivation offers a compelling explanation for why female adolescents struggling with academic issues exhibit high levels of intrinsic motivation to improve (Asaba et al., 2022). In addition, because of the nature of the underlying problem, these adolescent girls will always have the undivided attention of parents and teachers (Mavura et al., 2022). With support from both parents and teachers, they will be able to ignore the pressure to start using substances and instead concentrate on improving their academic success.

In Malaysia, when it comes to male adolescents, there are many societies with traditional gender norms that encourage males to be self-reliant, stoic, and emotionally restrained (Nawi et al., 2021). Perceiving help as a sign of weakness or vulnerability can discourage males from seeking assistance (Rodzlan Hasani et al., 2021). Therefore, when young males struggle academically, they may turn to substances as coping mechanisms, as they can temporarily provide a sense of confidence or relief.

The second domain centers on family dynamics, which significantly impact the development of adolescents. A Malaysian study (Rodzlan Hasani et al., 2021) strengthens the finding that the loss of either parent aggravates substance use among school-going adolescents. The death of parents threatens adolescents' emotional support, direction, and sense of security. Adolescents who experience feelings of uncertainty or instability because of this disruption may seek solace in substance use (Mavura et al., 2022). Insufficient parental supervision can provide adolescents

with more opportunities and freedom to engage in substance use without immediate consequences or detection.

The community, which surrounds adolescents, is the final domain. Indigenous people from East Malaysia, specifically Sabah and Sarawak (the "other Bumiputeras" group), had the greatest prevalence of substance use in this research. Adolescent substance use may have had complex causes, including cultural and traditional factors. It is common practice for the "other Bumiputera" category, which includes indigenous people from Sabah and Sarawak, to drink alcohol during celebrations and social events (Rodzlan Hasani et al., 2021). While in West Malaysia, it is illegal to sell alcohol to Muslims, and the country strictly prohibits alcohol consumption for all Muslims. This result explains the high prevalence of tobacco uses than alcohol and drug use as monosubstance and tobacco and drug as polysubstance use in Malaysia among the school-going adolescent at the drug hotspot area.

Furthermore, studies rarely examine the lower likelihood of substance use among adolescents who have lived in communities for less than 10 years. The role of community in the socio-ecological model is very important in shaping adolescents (Duh-Leong et al., 2021). Adolescents who have only recently moved to a neighborhood may not have had much of an opportunity to interact with drug-using friends and acquaintances. Shorter residency terms may reduce the likelihood of a person making connections with others who share a history of substance use.

Interestingly, previous studies did not explore the fact that adolescents from East Malaysia are more likely to be substance users.

East Malaysia is a low-income state, with the poorest districts, nine out of ten, located within it (Economy, 2021). Hence, East Malaysia is generally at a disadvantage because of the lack of accessible recreational opportunities, community hubs, and structured programs (Nawi et al., 2021). Due to a smaller population and fewer resources dedicated to prevention, substance use may be more prevalent in these locations (Mokwena & Setshego, 2021). Adolescent substance use is more likely to be pervasive in more isolated places, where it also has a greater chance of becoming institutionalized as part of the cultural fabric (Nawi et al., 2021).

This is one of the first local studies to evaluate substance use in a high-risk community although the cross-sectional design limits the causality of the factors revealed in this study toward substance use. Previous studies did not focus on substance use in high-risk communities like drug hotspot areas. Furthermore, the data collection took place during the coronavirus disease 2019 (COVID-19) pandemic, which restricted the researchers' mobility by prohibiting outsiders from entering school premises. Thankfully, we collaborated with teachers to conduct the research under their guidance, asking students to respond to the questionnaire. Additionally, the government implemented a nationwide lockdown due to the pandemic, which delayed data collection. This study concludes that there is a higher prevalence of substance use among school-going adolescents in drug-based hotspot areas, and the predictors involve individual, familial, and community domains. Therefore, to minimize substance use among school-going adolescents, intervention programs, substance policies, and professional support must be improved or created. A culturally sensitive, gender- and family-based intervention is key to solving the problems faced by male adolescents from broken families. Those adolescents need education and awareness programs. Educational institutions, medical professionals, and community groups can educate adolescents about substance use and better stress management techniques. Adolescents who receive this training are better equipped to evaluate their activities and make wise choices. Finally, future cohort studies should include those with disabilities, undocumented or stateless adolescents, and those with legal difficulties.

Ethics Committee Approval: This study was approved by the Ethics Committee of the Secretariat of Research Ethics, Universiti Kebangsaan Malaysia, Faculty of Medicine, Cheras, Kuala Lumpur, Malaysia (Date: 23 March 2020 Reference no: UKM PPI/111/8/JEP-2020-174(2)). Approval from the Education Planning and Research Division, Ministry of Education Malaysia, state, and district education offices was obtained before data collection.

Informed Consent: Written informed consent was obtained from the students and/or parents who agreed to take part in the study.

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ORIGINAL ARTICLE

Life and Stigma Experiences of Individuals With Substance Use Disorder: A Qualitative Study

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Main Points

- Individuals with substance use disorders may face social stigmatization and negative attitudes in their families, social environment, and even in the healthcare field.
- This study aimed to determine the life and stigma experiences of individuals with substance use disorder who received inpatient treatment in an adult detoxification center.
- The study revealed that participants experienced negative emotions, including regret, guilt, and shame, due to stigmatization, exclusion, and discrimination.
- Substance use disorder treatment should not only focus on pharmacotherapy but also on the psychological and social needs of the individual.

Abstract

This study aimed to determine the life and stigma experiences of individuals with substance use disorder who received inpatient treatment in an adult detoxification center. Data for this qualitative phenomenological study were collected in Istanbul between April and December 2023. The data were analyzed using Colazzi steps. A total of 26 individuals with substance use disorder were interviewed. The content analysis identified three main themes. The initial topic discussed was the effect of substance use on individuals' lives. The second theme discussed was stigmatization. The final theme addressed coping with stigmatization. The study revealed that participants experienced negative emotions, including regret, guilt, and shame, due to stigmatization, exclusion, and discrimination. Substance use treatment should not only focus on pharmacotherapy but also the psychological and social needs of the individual. Furthermore, to address negative attitudes in society, mental health professionals could inform families and disseminate anti-stigma programs.

Keywords: Life experience, psychiatric nursing, qualitative research, stigmatization, substance use disorders

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Introduction

Substance use disorders, which are increasing all over the world and in our country, are a significant public health problem leading to psychological, social, physical, legal, and economic consequences (Uzun & Alban, 2020; Mokha, 2024; Dikeç & Kutlu, 2020). They can hinder individuals from fulfilling their social roles and responsibilities. By affecting individuals' self-control, they may cause behaviors that are not accepted by society, thus leading to new psychosocial problems (Dikeç & Kutlu, 2020; Cüceler et al., 2022). One psychosocial problem

individuals may face is social stigmatization and internalized stigma (Çam & Dağlı, 2017).

Mental disorders have historically been subject to significant stigma (Uzun & Alban, 2020). Among mental disorders, individuals with substance use disorders are one of the most stigmatized groups in society (Akhan & Gezgin Yazıcı, 2023). In society, individuals with substance use disorders are often subject to prejudice, with negative stereotypes suggesting that they are weak-willed, dangerous, and dishonest. Substance use disorders are often not recognized as mental disorders, which

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can lead to individuals being unfairly blamed for their problems (Crapanzano et al., 2019; Yılmaz & Cüceler, 2019). Individuals with substance use disorders may face social stigmatization and negative attitudes (Dikeç & Kutlu, 2020).

Individuals with substance use disorders often face challenges in areas such as interpersonal relationships, accessing healthcare, finding employment, and securing housing due to stigmatizing attitudes in society (Dikeç & Kutlu, 2020; Nolte-Troha et al., 2023; Mokha, 2024). Individuals who encounter difficulties in these areas may receive less treatment for physical or mental health issues (Crapanzano et al., 2019; Solberg & Naden, 2020) and may become homeless, losing their homes (Türkeş & Buz, 2022). When individuals experience homelessness, they are often unfairly perceived as irresponsible and dangerous, with no connections to work, family, or society (Cüceler et al., 2022). To address these issues, individuals may use substances, perpetuating a harmful cycle (Dikeç & Kutlu, 2020).

It has been reported that some individuals with substance use disorders feel ashamed and guilty about this situation (Crapanzano et al., 2019). Individuals who experience intense feelings of shame and guilt may be more likely to use substances, avoid seeking treatment, and isolate themselves at home. All of these situations have the potential to negatively impact treatment motivation, which is crucial in the treatment of substance use disorder (Akhan & Gezgin Yazıcı, 2023). Adverse effects on treatment motivation can lead to non-initiation, dropout, or relapse (Crapanzano et al., 2019; Demir et al., 2022).

It is essential to investigate both the social stigma toward individuals with substance use disorders and the internalized stigma of individuals to identify possible experiences of stigmatization. Examining the areas where individuals are stigmatized is crucial in determining where social information can be provided. The purpose of this study is to thoroughly investigate the life experiences and stigmatization faced by individuals who have been diagnosed with substance use disorder and have undergone inpatient treatment at a regional psychiatric hospital. The research aims to answer two fundamental questions: “How does substance use impact the lives of individuals with substance use disorder?” and “What are the experiences of stigmatization faced by individuals with substance use disorders in their daily lives?”

Material and Methods

Research data were collected from April to December 2023 at the adult detoxification center of a regional mental health and nervous diseases training and research hospital in Istanbul. A purposive random sampling method was employed for this qualitative research design study. The study sample comprised adult patients who were diagnosed with substance use disorder, including alcohol, cannabis, hallucinogens, stimulants, volatile substances, opioids, sedatives, hypnotics, and anxiolytics, according to diagnostic and statistical manual-5 diagnostic criteria. Only those who completed the detoxification process and agreed to participate in the study were included. The study excluded patients who declined to participate, were in the detoxification phase, dropped out of the interview, had only a diagnosis of caffeine or tobacco use disorder, were followed up as outpatients, or had another accompanying mental illness. For this study's sample, individual

in-depth interviews were concluded upon reaching data saturation. A total of 26 participants were interviewed.

Data Collection

Hospitalized patients were informed about the interview process. A plan was then made to interview individuals who met the inclusion criteria. The interviews were conducted in private rooms within the clinic. The participants underwent two interviews in total. In the first, individual in-depth interviews were conducted at the scheduled time, and in the second, the accuracy of the themes and sub-themes was tested. If individuals were discharged during this period, they were asked to evaluate the themes and sub-themes during outpatient follow-up. An experienced clinical psychiatric nurse with a Ph.D., who has worked with individuals with substance use disorders in this unit for 12 years and is currently employed at the clinic, conducted in-depth interviews. The participants provided written and verbal consent to record their interviews. The duration of each interview averaged between 45 and 60 minutes. Data were collected using the Information Form and Semi-structured Interview Form.

Information Form

The researchers developed a form that included ten questions to determine age, gender, educational status, marital status, employment status, substance use, duration of use, and the presence of a person with a mental disorder in their family.

Semi-Structured Interview Form

The researchers created twelve questions by reviewing the literature (Burgess et al., 2021; Mokha, 2024; Dikeç & Kutlu, 2020). The form aimed to determine individuals' experiences of stigmatization in their daily lives.

Data Analysis

The characteristics of the participants were analyzed using SPSS 24.0 version by number, percentage, mean, standard deviation, minimum, and maximum. The study employed Colaizzi's phenomenological interpretation method to analyze the data. This approach reveals experiences and meanings through data analysis. Colaizzi's phenomenological data analysis involves the following steps: (1) The descriptions provided by the participants are carefully analyzed to comprehend the meanings assigned to the phenomenon and the emotions felt. (2) Important statements directly related to the case have been selected. (3) By analyzing these key phrases, meanings are formulated. (4) Formulated meanings are organized into sub-themes, themes, and categories. (5) The results achieved are combined with rich and comprehensive life experiences. (6) The phenomenon's fundamental conceptual structure is defined. (7) The study involved re-interviewing some participants and verifying the findings by comparing them with the participants' own experiences (Colaizzi, 1978).

Ethical Consideration

Before starting the study, we obtained approval from the Fenerbahçe University Social and Human Sciences Ethics Committee, dated 01.03.2023, numbered 2023/2-2. Subsequently, we obtained institutional approval from the affiliated training and research hospital's Medical Specialty Thesis Ethics Committee for the relevant adult detoxification center. Written informed consent was obtained from all study participants.

Results

Participant Characteristics

The study participants had a mean age of 34.38 years [standard deviation (SD) = 9.72], with a majority being male. The majority of participants had a primary school education. They perceived their economic status to be at a middle level. Analysis of the substances used showed that they consisted of alcohol, multiple substances, synthetic cannabinoid, opioid and sedative, hypnotic, or anxiolytic. The study revealed that the participants had been using substances for an average of 14.15 (8.71) years and had attempted to quit substance use 3.86 (3.94) times (Table 1).

Thematic Analysis

The content analysis identified three main themes. The initial topic discussed was the effect of substance use on individuals' lives. This theme analyzes the impact of substance use on individuals' social lives and health, as well as the legal and economic issues that arise from it. The second theme was stigmatization. Under this theme, the discussion centered around labeling, exclusion, and stigmatization related to substance use. The final theme

was dealing with stigma. The third theme of this study is to examine adaptive and maladaptive coping strategies used to combat stigma (Table 2).

Effects of Substance Use on Life

All participants reported experiencing difficulties in various areas of their lives, including family, work, children, friendships, romantic relationships, and marriage, after they began using substances. Some reported receiving support from their spouses, while others reported reaching the point of divorce due to their substance use. During the divorce process, one participant agreed with their spouse when empathizing with them:

If I were a woman, I would put myself in my partner's shoes. I had never thought about it before. Should I lie? I have the opportunity to think about it now. I ask myself, "How can I sit next to a man who is drunk?" I am speaking as my wife right now. She wonders how she can sit beside and joke with him because he has an unpleasant odor. He needs help articulating his thoughts and gaining knowledge on the topic he is discussing. Additionally, his mouth is shifted to one side, and his eyes are different. I would have ostracized him as well. I agree with my wife right now. (P22)

Some participants with children reported being unable to fulfill their parental responsibilities due to substance use. Participants who consumed alcohol noted that their children would withdraw to their rooms and avoid interacting with them due to the smell of alcohol. The reaction of one participant's adult child was described as follows:

I mean, I have a 23-year-old daughter. When I go home drunk, all ... I have three daughters, to be honest ... I go into the house, and the children scatter like crazy; they escape me. Why?... Just because of the smell ... I do not shout or anything, I mean ... I enter the house, and they all scatter because of the smell; of course, they were disturbed. (P3)

Most participants reported experiencing workplace problems due to substance use. One participant summarized the work-related problems caused by alcohol use as follows:

In my work life, going to work drunk was a big problem. I was warned a few times and verbally warned. I ignored them. I worked for 12 years in a company. Then we had a court case. Because of compensation. There were problems like this. (P26)

Although some participants had no problems finding, renting, or buying a house as a result of their substance use, others admitted that they did not choose to return to their homes because they wanted to use substances in a more comfortable environment or to avoid their families finding out about their substance use, so they had to stay on the street or in a car until the effects of the substances had subsided. One participant reported staying in the hospital garden for sixteen days before starting treatment and also reported substance use during this time.

Before I was admitted here, before the 4th of July, I stayed here in the garden for sixteen days. At the entrance of that

Table 1.

Characteristics of the Participants

Characteristics	Mean (SD)	Min – Max
Age	34.38 (9.72)	23 – 52
Gender	n	(%)
Female	2	7.7
Male	24	92.3
Educational status		
Elementary education	10	38.5
High school	9	34.6
University	7	26.9
Economic situation		
Poor	2	7.7
Medium	20	76.9
Good	4	15.4
Employment status		
Working	11	42.3
Not working	15	57.7
Duration of substance use (year)	14.15 (8.71)	1 – 30
Substances used		
Alcohol	9	34.6
Polysubstance	10	38.5
Synthetic cannabinoid	1	3.8
Sedative, hypnotic, or anxiolytic	1	3.8
Opioid	5	19.2
Substance use in family		
Yes	4	15.4
No	22	84.6
Trying to quit substance	3.86 (3.94)	1 – 20

Table 2.
Themes, Codes, and Frequency

Themes	Codes	Frequency
Effects of substance use on life	Effects of substance use on social life	25
	Effects of substance use on health	14
	Legal problems caused by substance use	7
	Economic losses caused by substance use	16
Stigmatization resulting from substance use	Label	17
	Exclusion due to substance use	22
	The emotional response to stigmatization	21
Dealing with stigmatization	Adaptive coping	12
	Maladaptive coping	10

gate...at the entrance of Bakırköy State Hospital, I lived in the garden for sixteen days. I did not want to go home like that; I did not want to upset my family. I did not go home when my wife said so, so I did not go home. I mean, I preferred not to go home ... I did not rent a house or anything; I lived in the garden. I stayed here because I was panicking; I was panicking if I did not use it. I thought I would die; I thought I would be crippled with that fear. Well...I was always at the emergency room door here for sixteen days. (P2)

Some participants reported that they were unable to attend events such as weddings and funerals because they were under the influence of the substance or wanted to use it as soon as possible and that they experienced social isolation. According to one participant's explanation,

I started not attending things like mass weddings, associations, and funerals. I mean, I could not even go to the funerals of my closest ones because I had drunk alcohol the day before. I could not be a part of that society. I started to get bored at weddings. In that process, for example, I wanted to drink at the wedding. I started to have weaknesses such as let me go and drink alcohol as soon as possible. (P20)

The majority of participants reported a deterioration in their mental and physical health as a result of using the substance. Some participants reported anger, memory problems, depressive symptoms, hallucinations, fatigue, weakness, and body aches, while others reported weight loss. Patients who used certain substances reported a decline in their skin and dental health. One of the participants described the skin sores and gum problems as follows:

I used to use methamphetamine, to be honest. I did, I mean, before I came in here. My teeth ... you know, they are not aesthetically beautiful. In addition to that, this methamphetamine has caused numerous scars on my body. You know, like, I rip them off, they bleed. Apart from that, you can see things on my forehead, you know, such lumpy things. I can say that the effects of this methamphetamine on my body are too much, physically. (P23)

The participant reported that she had lost weight and was working in a supermarket, stocking the aisles, but was experiencing pain from her substance use, which was preventing her from doing her job.

Weight, I had a very extreme weight loss. I dropped from seventy kilos to fifty kilos in 2 months. After that, when my family realized the situation, I came here again. It started to cause great physical pain after a while. Now ... normally, because I work in the market sector, I cannot line the aisle because of the pain. I could not lift anything. When I bent down, I could not get back up. When I got up, I felt like I would stagger and fall to the ground. (P12)

Some participants reported that they had lost their driving licenses for drunk driving, some reported that they had committed theft to obtain substances, and some reported that they had started selling substances in order to obtain substances. One participant reported being incarcerated for substance sales, which led to subsequent issues;

How did it affect your life? Badly affected. Here I am in prison. For example, I will get married when I go to prison; I am engaged. His family kidnapped him. I could not get engaged. I could not get married. Because I went to prison, my father started drinking alcohol. My mum left home. My family fell apart. It was not good for everything. I could not work anyway. I could not work, so I had to start trading. I mean, it is bad. (P19)

Almost all participants reported that substance use hurt their financial situation. One participant summarized the economic problems caused by the substance as follows:

I cannot pay my debts when I start drinking all the time at work, my credit cards explode, etc. My family withdrew support from me; I had two rental incomes. Moreover, when they were taken away from me, it caused much negativity in my life. This time, I felt even more empty. This time, I ended up with loan sharks. I got money from outside. I got money from loan sharks. I could not pay them; it was a bigger problem. Then I put my flat on the market. Then, my brother-in-law came in and helped me. My debts have been paid, and so on, so there are many examples like this. (P26)

Stigmatization Resulting From Substance Use

Under this theme, participants reported on the new labels they received as a result of their substance use, their experiences of exclusion, and the emotions they felt in the face of these stigmatizing experiences. It was found that many participants referred to themselves by alternative names in their social circles due to

their substance use. The most commonly used terms for substance users were “substance addict,” “junkie,” and “user,” while “drunkard” was the most frequently used term for alcohol users. One participant reported the insulting nature of this labeling as follows:

You are a junkie ... junkie' ... You are a junkie' ... Isn't that a very insulting word? When you look at it ... It is a very mocked and ridiculed word, but when you look at it, and after you turn 30, you are not a 20-year-old or 18-year-old. You are 30 years old, and when you are 40 years old, if you have a child, I do not have a child, so I do not know that feeling. However, I am 30 years old now, but when someone calls me a “junkie,” I am sweating right now, look how I am sweating right now when I say the word “junkie” ... that is what I was called (The patient wiped his forehead with his hand, showing his face). (P1)

Almost all participants reported being excluded by their family, relatives, friends, and neighbors. One participant reported being excluded by their spouse, child, sibling, and parents.

My child was ashamed of me. So my wife started not looking at me. My mum and dad started avoiding me. My sister started not to look at me or talk to me. I started not talking to anyone. That is how it affected me. (P7)

One of the participants said that he/she was held responsible for whatever happened to him/her because he was a substance addict and that he/she was mistreated. The participant stated that he/she was accused of theft as follows:

I was accused of theft because of my substance abuse in my circle of friends... Because of the three people we sat with ... For example, someone stole his mobile phone. I was framed for the offense because I am a heavy substance user. A few days later, it turned out that the boy had taken it. Otherwise, the use of the teacher ... (silence). (P9)

Some participants reported that they had experienced exclusion in their romantic relationships due to substance use and that they had met their relationship needs by using more substances. One participant described the experience as follows:

Where the opposite sex fills, the heart is also important. We have left it empty because of matter. You know, when a person tells his/her problems to someone whom he/she sees as a life partner, he/she may feel relieved and may not drink substances, but this time, girls did not approach us because “this is a substance addict.” So we did not go for girls. I mean, our emotional life was empty. We had to replace it with substances. (P17)

The participants indicated that they experienced feelings of being belittled, humiliated, regret, guilt, and shame in the context of stigmatization, exclusion, and discrimination. One of the participants expressed their sentiments as follows:

I mean, while I was at the top level in my work environment, I suddenly fell to the lowest level. I mean, it was a very embarrassing thing for me. So, it was stigmatizing for me,

and I had to quit my job. I could not swallow my pride, so I quit. (P7)

Dealing with Stigmatization

This theme explores how the participants responded to their experiences of stigmatization and exclusion. The results indicated that nearly half of the participants employed adaptive coping strategies, whereas the other half employed maladaptive coping methods.

It was established that some participants sought treatment due to the stigmatization and exclusion they had experienced and, therefore, applied to the clinic. Some of the participants made the following statements:

You know I am in hospital right now. I think that it was a success because I came voluntarily. I am neither a judicial case nor have I committed a crime nor been forced to come by my family. I am an individual; I am a mature person, educated, a university graduate, and a person of advanced age. I am also a very aware child. My biggest initiative was to be admitted to hospital, and from this time onwards, I want to be a good son to my country and my family by correcting myself. (P1)

Some participants indicated that they continued to utilize substances to cope with the negative experiences they were facing. The statements of a participant were as follows:

I could not cope, do I lie? So you were out for two days. You did not drink for two days. How is that? I mean, to get the weight off you, to get the weight off you. I was doing it for two days, and then I was saying, “I do not care what anyone says, I am making my money, I am drinking.” I was going on again, sir. When I drink, I feel like I am forgetting. Here, how can I say, if you ask 10 of those who have been hospitalized here, nine of them will say, “I was forgetting when I drank.” I could not think of anything. I mean, to not remember yesterday. That is what I was doing, teacher. That is how I coped ... I could not cope any other way. (P22)

Discussion

This study examined the life and stigma experiences of people with a substance use disorder, looking at the impact of substances on their social, physical, mental, legal, and economic lives, as well as their experiences of stigma and coping strategies. Substance use can often hurt family relationships, leading to conflict, loss of trust, domestic violence, and disruption of family life (Dikeç & Kutlu, 2020; Mokha, 2024). Substance use is associated with a range of adverse psychological, physical, social, legal, and economic consequences, including family conflict, financial difficulties, legal problems, reduced work productivity, and social isolation (Mokha, 2024). All participants in this study reported experiencing problems in various aspects of their lives, including family, children, friends, romantic relationships, marriages, and work, after they began using substances.

Substance use can cause a range of medical problems, including cardiovascular, liver, and respiratory diseases; gastrointestinal problems; nutritional deficiencies; sexual and reproductive health

problems; oral and dental health problems; certain cancers; and serious infectious diseases such as hepatitis C and HIV due to a weakened immune system. Death from overdose is also a risk. It is important to note that the type of substance used can affect the specific medical problems that can occur (Amin et al., 2023; Dikeç & Kutlu, 2020; Mokha, 2024). The participants' statements regarding fatigue, weakness, body aches, weight loss, and deterioration of skin and dental health appear to align with the literature on the adverse effects of substance use on physical health.

Substance use is often associated with criminal activities, e.g., substance use, possession, production and dealing, theft, extortion, etc., to obtain substances, and with dangerous behavior, e.g., drink-driving and aggressive driving (Dikeç & Kutlu, 2022; Mokha, 2024). These behaviors can result in legal consequences, such as arrest, imprisonment, fines, and a criminal record (Mokha, 2024). The European Drug Report states that there were approximately 1.5 million substance-related offenses reported in the European Union in 2020, which is a 15% increase compared to 2010 (The European Monitoring Centre for Drugs and Drug Addiction, 2022). According to the Türkiye Drug Report, 35.4% of those convicted and imprisoned in Türkiye in 2022 were there for substance-related offenses (Türkiye Drug Report, 2023). This study supports the literature in that it reports that those caught driving under the influence of alcohol, theft to obtain substances, and selling substances to obtain substances had their licenses revoked, and those caught selling substances had their licenses revoked and received probation.

Substance use disorders can result in absenteeism, low work performance, and decreased productivity, leading to an increase in work accidents. Additionally, the families of addicted individuals may experience serious victimization due to their loved one's loss of work (Cüceler et al., 2022; Mokha, 2024). Therefore, this situation affects individuals' and society's overall productivity and economic stability (Mokha, 2024). Research has found a link between employment status and substance use, with higher rates of substance use among the unemployed (Nolte-Troha et al., 2023), suggesting that substance use may be a risk factor for future job loss (Türkeş & Buz, 2022). In this study, the vast majority of participants reported that their substance use hurt their economic situation, stating that they had lost income because they were unable to work due to substance use and that they were dependent on financial support from their families.

People with substance use disorders are often perceived as having more control over their illness than people with other mental illnesses, leading to a greater sense of responsibility for their behavior (Goodyear et al., 2018). The language used to describe substance use disorders and related issues may perpetuate existing stigma against people with substance use disorders and may reinforce implicit cognitive biases that can negatively affect individuals' participation in treatment and their health outcomes (Ashford et al., 2018; Werder et al., 2022). People with substance use disorders are often stigmatized and discriminated against by society and labeled with derogatory terms such as "liars," "losers," "junkies," "weak," "dirty," "sleeping," and "addicts" (Atayde et al., 2021; Wilkens & Foote, 2019; Burgers et al., 2021; Pasman et al., 2024). In this study, many participants reported being called by different names due to their substance use. The most commonly

used terms for substance users were "substance addict," "junkie," and "addict," while "drunkard" and "drunk" were frequently used for alcohol users. The language used toward individuals with substance use disorders is believed to reinforce social stigmatization (McGinty et al., 2019) and hurt the quality of care (Goodyear et al., 2018). Favorable terms are believed to reduce stigma (Ashford et al., 2019) effectively. To avoid stigmatization, it is recommended to use alternative terms such as "person with substance use disorder" instead of stigmatizing terms like "addict" or "substance addict" (McGinty et al., 2019).

People with substance use disorders are often subject to discrimination and stigma, leading to isolation from society and conflict in interpersonal relationships (Yılmaz & Cüceler, 2019). Individuals with substance use disorders are considered a high-risk group for social exclusion. While substance use disorders are a problem in themselves (Derin & Tapan, 2017), they also lead to various social problems, including exclusion (Crapanzano et al., 2019; Derin & Tapan, 2017). Research has indicated that individuals with substance use disorders perceive themselves as being excluded from society and that society does not accept substance use disorders (Akbaş & Mutlu, 2016; Ingram et al., 2020; Soy & Kocataş, 2020). In line with the literature, the findings of this study indicate that nearly all participants experienced ostracism from their families, relatives, friends, and neighbors. Some even reported that their family members and spouses treated them differently and avoided them after discovering their substance use. Additionally, a few participants noted that their relatives changed their behavior toward them when encountering them in public.

When examining the most common emotions experienced by addicted individuals due to stigmatization, negative emotions such as shame and guilt are often prevalent (Çam & Dağlı, 2017; Gul & Aqeel, 2021). Substance use can cause shame, an emotional state where individuals perceive themselves as inferior, defective, or worthless (Gul & Aqeel, 2021). Stigmatizing attitudes in society can cause individuals struggling with addiction to experience low self-esteem, shame, and guilt, leading them to withdraw from society and avoid seeking help (Birtel et al., 2017; Paris et al., 2020). They may hide their use for fear of being judged (Paris et al., 2020). In this study, participants reported feeling belittled, humiliated, and experiencing regret, guilt, and shame due to stigmatization, exclusion, and discrimination.

Substance use may be a coping mechanism for negative emotions (Russell et al., 2019). The continuation of substance use is often attributed to negative emotional states and the ineffective use of emotion regulation strategies (Dingle et al., 2018). Stigmatization can cause stress for individuals struggling with substance use (Birtel et al., 2017). Due to stigmatization, individuals struggling with substance use may experience negative emotions such as shame and guilt, which can lead to increased substance use and risky behaviors (Çam & Dağlı, 2017; Bielenberg et al., 2021). Therefore, individuals may turn to substances as a means of coping with social problems, leading to a vicious cycle (Dikeç & Kutlu, 2020).

On the other hand, stigma is known to be a barrier for people with substance use disorders to enter and remain in treatment

or to access harm reduction services (Bielenberg et al., 2021; Crapanzano et al., 2019; Werder et al., 2022). In this study, nearly half of the participants reported using maladaptive coping methods, continuing to use substances to cope with stigmatization, and frequently increasing their substance use. However, in contrast to the literature, some participants in this study reported seeking treatment due to the stigmatization and exclusion they faced, leading them to apply to the clinic. The study's location in an inpatient treatment center and the participants' motivation may have influenced this result.

Limitations

The information obtained from the study is limited as it is based solely on in-depth interviews with participants. The data was collected by a psychiatric nurse employed by the institution. This situation may have prevented participants from disclosing any stigmatization they may have experienced from mental health professionals. Therefore, impartial individuals should gather data in future research. Finally, most participants were male, which is another limitation of this study. While limited services for women may affect this result, the findings often point to men's life experiences. In addition, the study was conducted with individuals receiving inpatient treatment rather than outpatient services, which can be considered another limitation due to the difficulty of following up with the latter.

The study found that participants experienced social, physical, economic, and legal problems as a result of their substance use, as well as stigma from their family, work, and social environments. It also found that substance use or treatment was used as a coping mechanism to deal with this stigma. The study revealed that participants experienced negative emotions, including regret, guilt, and shame, due to stigmatization, exclusion, and discrimination.

It is important to note that feelings experienced in the face of stigmatization can be a significant factor that leads individuals to alcohol and substance use, which can cause relapse. In addition to effective substance use disorder treatment methods, it is vital to address the stigmatization experienced by individuals and the associated feelings. The treatment should not only focus on pharmacotherapy but also the psychological and social needs of the individual. Furthermore, to address negative attitudes in society, mental health professionals could inform families and disseminate anti-stigma programs. This study aims to provide data for structuring anti-stigmatization interventions for patients, relatives, and society by conducting an in-depth examination of the lives and experiences of individuals who have been stigmatized.

Data Availability Statement: Data from this study could be shared upon reasonable request from the corresponding author.

Ethics Committee Approval: This study was approved by the Ethics Committee of Fenerbahçe University (Date: 01.03.2023, Approval No: 2023/2-2.).

Informed Consent: Written informed consent was obtained from the patients who agreed to take part in the study.

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ORIGINAL ARTICLE

Embodied Cognition in Substance Use Disorder: Evaluation of Implicit Muscle Activity in Forearms with Surface Electromyography

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Main Points

- Significant electromyography (EMG) activity was observed when participants discussed substance-related topics, suggesting a link to unconscious drug cravings.
- Electromyography activities of dominant and non-dominant forearms were similar during substance-related conversations.
- The study supports the idea that language processing can activate motor areas, potentially reflecting cravings in substance use disorder.
- Suppressed gestures may have contributed to increased forearm muscle activation during substance use discussions.

Abstract

This study investigates the role of embodied cognition in substance use disorder by examining involuntary forearm muscle activity, measured through surface electromyography, during conversations on substance-related and non-substance-related topics. Conducted with 16 participants undergoing detoxification, the research aimed to determine whether discussions about substance use would elicit greater electromyography responses, indicative of implicit motor imagery or unconscious cravings. Results revealed a significant increase in electromyography activity during substance-related conversations across all participants, regardless of forearm dominance, supporting our initial hypotheses. This suggests that discussions about substance use may trigger subconscious processes linked to past use experiences. The observed effect sizes were substantial, underscoring the robustness of these findings. Our research contributes to the understanding of substance use disorder by demonstrating how embodied cognition manifests in affected individuals and provides insights into implicit cravings, highlighting the potential of using electromyography to explore these unconscious processes. The study emphasizes the need for further research into the embodied cognition aspect of substance use disorder, ideally with larger sample sizes and control groups, to gain a more comprehensive understanding.

Keywords: Embodied cognition, implicit cravings, motor imagery, substance use disorder, surface electromyography

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Introduction

Mental images are perceptions that are created in the mind either from memory or simulated without external stimuli (Pearson, 2007). These mental

images play an important role in various cognitive processes, such as recalling memories of specific events, planning for the future, spatial orientation, planning navigation, and fostering creativity (Palmiero et al., 2019). Mental imagery is used in

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daily life to support various activities, from simple tasks like visualizing a shopping list to more complex tasks such as mentally rehearsing musical material and movements while playing an instrument (Clark et al., 2012). Mental images can be intentionally created, but they can also arise involuntarily, such as in dreams, hallucinations, and post-traumatic stress disorder (PTSD) (Nanay, 2021; Palmiero et al., 2019).

Mental imagery can be conducted through different sensory modalities, including visual, auditory, tactile, kinesthetic, olfactory, and gustatory, or a combination of these senses (Floridou et al., 2022). Motor imagery, a specific type of mental imagery, involves mentally simulating a motor task without actual physical movement (Driskell et al., 1994). The psychoneuromuscular theory proposes that the same neural pathways used to perform a specific movement are activated during mental imagery of that movement, leading to the activation of relevant muscles (Driskell et al., 1994).

In a series of studies conducted by Jacobson, one of the pioneers in motor imagery research, it was demonstrated that minimal involuntary movements (ranging from 0.07 to 0.32 mm on the mechanogram) occurred in the muscles related to the movement during the imagination of various motor tasks (Jacobson, 1932). Jacobson provided evidence suggesting that various muscle activities during the imagery process resembled those during actual movement but at a lower magnitude (Jacobson, 1932). Recent studies have shown increased electromyography (EMG) activity during motor imagery (Bakker et al., 1996; Wehner et al., 1984; Weiss et al., 1994). These findings suggest that EMG activity is specific to the muscles involved in the imagined action (Magill & Lee, 1998; Schmidt et al., 2018). Furthermore, it has been observed that the increase in EMG activity is proportional to the imagined effort; for instance, imagining lifting 9 kg dumbbells results in greater EMG activity compared to imagining lifting 4.5 kg dumbbells (Bakker et al., 1996; Wehner et al., 1984).

Mental images can be conscious or unconscious (Nanay, 2021; Pearson, 2007). A study on individuals diagnosed with PTSD revealed that they displayed strong EMG responses in their brow muscles to trauma-related cues, suggesting that some automatic reactions that participants may struggle to verbalize can be detected through subtle muscle activations (Pole, 2007). In another study, Dimberg and colleagues used the backward masking technique to unconsciously present participants with pictures of happy and angry facial expressions for only 30 milliseconds. The participants reacted to the images with corresponding EMG reactions in facial muscles, indicating their response to happy (zygomaticus major) and angry (corrugator supercilii) facial expressions (Dimberg et al., 2000).

Numerous studies have indicated that verbal instructions alone, without incorporating mental imagery, can strongly elicit sensory-motor responses (Mertens et al., 2020). For instance, through the use of functional imaging techniques, researchers have shown that listening to or silently reading sentences containing action verbs associated with mouth, hand, and leg movements activates the somatomotor regions linked to those actions (Hauk et al., 2004).

In recent years, the embodied cognition approach has provided a new perspective on the nature of mental imagery (Palmiero,

2014; Wilson, 2002). According to this theory, the body is embedded in a world with specific purposes and needs, and it cannot be separated from cognition as it shapes and structures it (Fridland & Wiers, 2018). This approach suggests that mental imagery is based on the reactivation of sensorimotor brain patterns involved during accurate perception (through experience) (Fridland & Wiers, 2018).

Recent studies have indicated that subtle cues related to substance use can activate the brain's reward system without conscious awareness (Childress et al., 1999; Gómez et al., 2008). Visual images and memories associated with substance use, whether triggered explicitly or implicitly, often intensify individuals' cravings for substances. These may include sensory images such as a positive first-time experience with the substance (Fridland & Wiers, 2018; Littel et al., 2016).

Just like we use our hands to perform many tasks in our daily lives, individuals with substance use disorder (SUD) also use their hands for various cognitive and motor functions such as acquiring, carrying, and using substances. In these individuals, focused bodily motor responses, particularly involving the hands (arms), may occur as a direct result of mental imagery formed during certain implicit verbal tasks or due to an increase in substance cravings, whether consciously or unconsciously (Littel et al., 2016).

There are no studies in the literature that aim to directly measure the conscious or unconscious motor responses of individuals with SUD triggered by various verbal processes through their hands. In this study, we focused on this specific area to investigate the effects of motor imagery and language processing on substance use desires and aimed to provide a new perspective for identifying the potential bodily manifestations of implicit substance use cravings in individuals with SUD.

In our study, we aimed to examine the right and left forearm EMG activities while discussing personal information other than substance use histories (such as marital status, occupation, educational background, etc.) and substance use histories with patients undergoing inpatient detoxification treatment at our clinic. Additionally, we aimed to compare the EMG activities of patients between their dominant and non-dominant forearms. Our first hypothesis for the study is that during conversations about their substance use histories, the forearm EMG activities of participants will be higher than the EMG levels during conversations unrelated to substance use. Our second hypothesis is that the EMG activity of the dominant forearm will differ from that of the non-dominant forearm.

Material and Methods

Study Sample

The participants in the study were individuals who had sought treatment at the Ankara Training and Research Hospital Alcohol and Drug Addiction Treatment Center for Substance Use Disorder as diagnosed by DSM-5 and had been using substances for more than 1 year. Volunteers for the study had to be 18 – 45 years old, literate, and had received treatment for SUD in the last

month. Additionally, participants were required to score higher than 23 on the mini-mental test, and were not diagnosed with orthopedic, neurological, or systemic diseases that could interfere with the study evaluations. Those with uncorrectable vision or hearing problems, as well as individuals currently taking medication for any other condition, were excluded from the study. Prior to the evaluations, the purpose and content of the study were explained to all individuals approved to participate by the psychiatrists, and written informed consent was obtained from each individual. The study was ethically approved by the Health Sciences Ethics Committee of Ankara Training and Research (dated October 27, 2023, No. 392-08).

The study recorded the demographic and physical characteristics of all individuals, along with information about their substance use, including the first substance tried, the type of substance they attempted to quit, the frequency of substance use, and the duration of exposure to the substance. The cognitive status of the individuals was assessed using the mini-mental state test, which efficiently evaluates cognitive performance in a standardized manner. The test examines functions such as registration, recall, language, orientation, attention, calculation, and the ability to follow simple commands. Each correct answer is awarded 1 point, with a maximum score of 30. In the study, a score below 24 points was considered an indicator of cognitive impairment, and individuals with scores of 24 and above were included (Folstein et al., 1975; Güngen et al., 2002).

Electromyography Data Collection and Analysis

Electromyography data were collected using the Noraxon Ultium EMG sensor system (Noraxon USA, Inc., Scottsdale, Arizona) with a sampling frequency of 4000 Hz per channel, gain set at 1000 (signal to noise ratio of 1 μ V RMS), common mode rejection rate (CMRR) of -100 dB, and input impedance greater than 100 $m\Omega$. Any hair on the skin was removed, and the area was cleansed with an alcohol swab before electrodes were connected to detect EMG signals. The electrodes were placed on both sides of the flexor carpi radialis (FCR), along a line on the palm side of the forearm between the medial epicondyle of the humerus and the capitate carpal bone, on the flexor carpi ulnaris (FCU) along a

line from the medial epicondyle to the ulnar styloid process, on the brachioradialis (BHR) along the line from the radial styloid process to just below the elbow joint, and on the extensor digitorum (EXD) at the midpoint on the back of the forearm, three-quarters down its length, in the direction of the muscle alignment as shown in Figure 1 (Gomez-Correa & Cruz-Ortiz, 2022). The data were sampled at a rate of 2000 Hz. Two filters were used: a band-pass filter with a range of 10 – 500 Hz, implemented using a first-order high-pass filter and a fourth-order low-pass Butterworth filter, to eliminate unwanted artifacts; and a 60 Hz notch filter to remove noise. Root mean square (RMS) values were calculated using a moving 100-ms window. The Noraxon MyoResearch XP program (version 3.16, Noraxon Inc, Scottsdale, AZ, USA) was used for data processing. The data from each trial were represented as a percentage of the calculated mean RMS of the maximal voluntary isometric contraction (MVIC) (%MVIC), and the average %MVIC of three trials was used for analysis (Hermens et al., 2000).

Procedures

Each muscle was subjected to a MVIC, and the EMG signal amplitude was recorded to normalize the EMG data. Participants were requested to carry out three repetitions of 5-second maximal contractions against manual resistance in specific muscle test positions. These positions were where the muscle exhibits the highest activation for the surface EMG measurements of the MVIC values of the forearm muscle groups on both sides. There was a 30-second rest period between each repetition. The MVIC value of each muscle was measured three times with a 1-minute rest period between repetitions.

After the MVIC assessment, participants were given a 5-minute rest period. Then, two different conversations were held with the individuals. The first conversation served as a control condition and was non-addiction-related. It lasted for 3 minutes and did not include any addiction-related keywords or cues (Basal Level—BL). The content of the conversation consisted of standardized structured interview questions, such as the participants' place of birth, number of siblings, their parents' profession, marital status, who they live with, and whether they have children. The

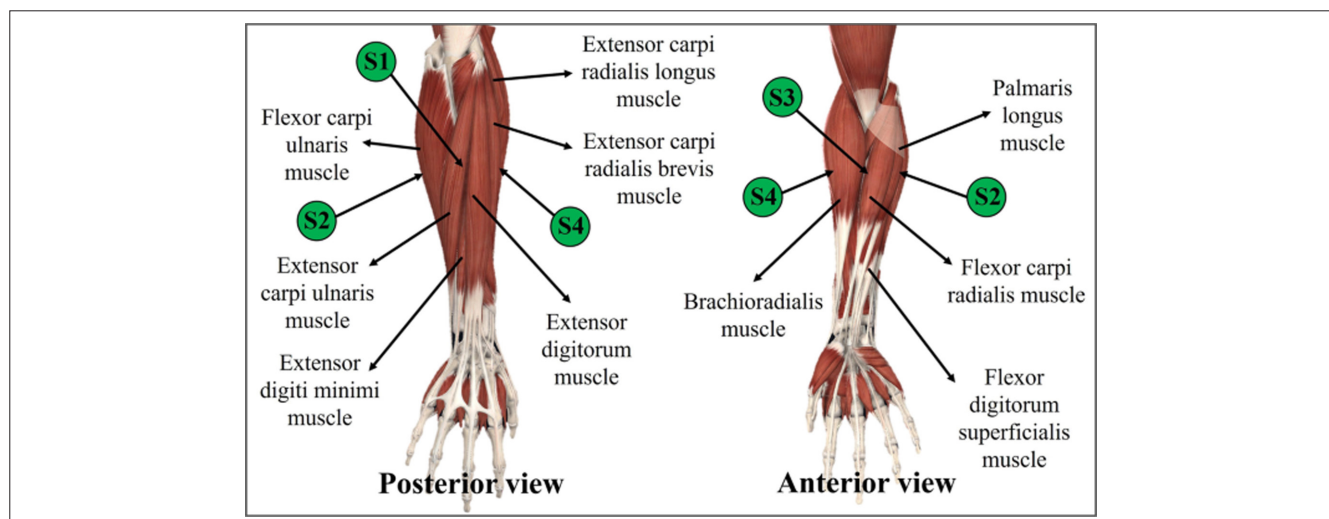


Figure 1. Superficial EMG Electrode Placements According to SENIAM Criteria (Gomez-Correa & Cruz-Ortiz, 2022).

questions were: 1. Where is your birthplace? Can you tell us a little about this place? 2. How many siblings do you have? 3. What is your parents' profession? 4. What is your marital status? If you are married, do you have children? 5. Who are you currently living with? After another period of rest, the second stage introduced a 3-minute speech delivered by a psychiatrist specifically addressing drug addiction (substance-related topics-SRT).

During the conversation, we used a standard structured interview form with questions about the patients' first substance use, including their age at first use, the type of substance they started with, their initial feelings when they used it, the duration of their substance use, the current types of substances they use, frequency of use, their feelings while using the substance, how they use it, and how they feel when they don't use it. Each question was designed to gather specific information: 1. At what age did you use substances for the first time and what was the first substance you used? 2. Can you talk about what you felt when you first used substances? 3. How long have you been using substances, and what substance(s) do you use now? 4. How often and in what ways do you use substances, and what are your feelings about the substance you use now? 5. Can you talk about your feelings when you don't use substances?

We also recorded synchronized video footage using a Logitech Web camera alongside EMG measurements to monitor participant responses. Participants were instructed to maintain a neutral position with their arms resting comfortably on the table without moving their forearms and hands. Electromyography signals were continuously recorded from their forearm muscles during both stimuli presentations (Figure 2).

Statistical Analysis

The data analysis was conducted using IBM SPSS Statistics 26. The normality of the variables was assessed both visually (using histograms and probability plots) and analytically (using Kolmogorov – Smirnov and Shapiro – Wilk tests). Descriptive

statistics were presented as mean $\pm$ standard deviation, median (minimum; maximum) for numerical variables, and frequency (percentage) for categorical variables. The Wilcoxon signed-rank test was used to determine the difference in repeated measurements between the two factors on %MVIC for individuals with SUDs and to compare the dominant and non-dominant sides. The effect size was interpreted as “small” ($0.10 - <0.30$), “medium” ($0.30 - <0.50$), and “large” (0.50 and above). Statistical significance was set at $p < .05$ (Field et al., 2012).

A post-hoc power analysis of our study was performed with G*Power software, using the right FCR muscle as the primary outcome. According to the analysis, with an effect size of 1.761 and $\alpha = 0.05$, the study power was estimated to be 99% (Field et al., 2012).

Results

This cross-sectional study involved 16 individuals with SUD, including one woman and 15 men, all of whom were right-handed. The average age and body mass index of the participants were 29.38 ± 5.25 years and 23.16 ± 2.74 kg/m², respectively. The average mini-mental state test score for the individuals was 28.63 ± 1.54 . Upon examining the duration of substance use, it was found that the minimum duration was 3 years, the maximum was 25 years, and the average duration was 12.5 ± 6.26 years. All individuals reported using substances daily. The socio-demographic data and substance use characteristics of individuals are shown in Table 1.

In our study, we found a statistically significant difference in individuals' basal EMG activities and EMG activation when they were exposed to substance-related topics ($p < .001$). This difference had a significant effect size, as shown in Table 2.

No statistical difference was found when comparing the differences between basal level and exposure to substance-related

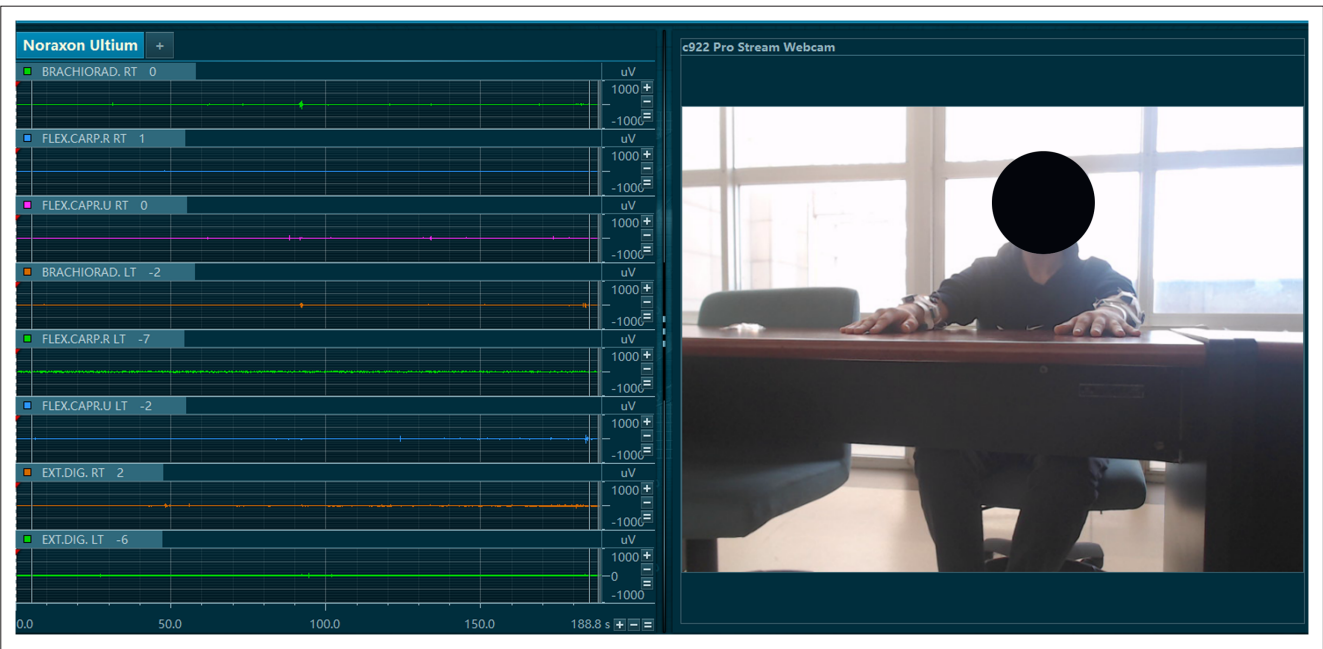


Figure 2. Participant Position and EMG Recordings during Two Different Sound Conversations.

Table 1.
Socio-Demographic Data and Substance Use Characteristics of Individuals

N = 16	Mean $\pm$ SD	Min – Max
Age (year)	29.38 $\pm$ 5.25	23 – 37
BMI (kg/m ²)	23.16 $\pm$ 2.74	18.92 – 29.04
Mini mental state test score	28.63 $\pm$ 1.54	24 – 30
Substance use duration (year)	12.50 $\pm$ 6.26	3 – 25
	n	%
Gender		
Male	15	93.75
Female	1	6.25
Dominance		
Right	16	100
Left	0	0
Education level		
Primary school	1	6.25
Secondary school	4	25.00
High school	10	62.5
University	1	6.25
Marital status		
Single	11	68.75
Married	5	31.25
The substance currently used		
Poly-drug	5	31.25
Metamphetamine	5	31.25
Synthetic cannabis	1	6.25
Cocaine	1	6.25
Heroin	4	25.00
The first substance use		
Cannabis	14	87.50
Metamphetamine	1	6.25
Heroin	1	6.25

Note: BMI = Body mass index; N = number; SD = standard deviation.

topics of dominant and non-dominant forearm EMG activities ($p > .05$), as indicated in Table 3.

Discussion

In our study examining implicit muscle activity in individuals with SUD, we found that when discussing their substance use histories, the EMG activities of the BHR, FCU, FCR, and EXD muscles were significantly higher compared to conversations unrelated to substance use. While various studies exist on muscle activation during different imagery methods, ours is the first to explore muscular activations during dialogue about substance use histories in individuals with SUD. We believe that the results of our original study offer a new perspective on identifying potential physical signs of implicit substance cravings in substance users.

Several studies have shown that when people imagine performing a physical action, similar brain networks are activated as when they actually perform the action. These brain networks include the primary motor cortex, premotor cortex, cerebellum, and somatosensory cortex. This activation leads to the involvement of various muscles related to the imagined action (Bakker et al., 1996; Wehner et al., 1984; Weiss et al., 1994). In our study, participants may have engaged in mental imagery of past substance use experiences, such as searching for, purchasing, carrying, and using substances, even if they were not directly instructed to do so. This could have resulted in increased forearm muscle activity, as measured by EMG.

Research on tasks such as motor imagery has demonstrated that there is a slight increase in EMG activity in the muscles involved in the imagined action (Magill & Lee, 1998; Schmidt et al., 2018). Furthermore, studies have indicated that this phenomenon is related to whether the muscle involved is the dominant or non-dominant one. In a particular study, participants were instructed to mentally visualize hand movements using either their right or left hand, and disparities were observed in the lateralization of the motor cortex between those who used their right hand and those who used their left hand during the mental imagery of hand movements (Willems et al., 2009). In our study, participants were not given specific imagery tasks for either arm. Due to reasons such as individuals often using both arms for tasks like purchasing, carrying, operating devices, and using substances, an increase in activation may have been observed in the EMG of both forearms. A study on tennis players found that muscle activation differed between the dominant and non-dominant extremities during different phases of a backhand stroke performed with both hands (Tai et al., 2022).

In our study, we found that during conversations about substance use, there was a noticeable difference in muscle activation between the dominant and non-dominant sides for certain muscles. The BHR, FCU, and EXD muscles showed more pronounced activation in the dominant side, while the FCR muscle had more pronounced activation in the non-dominant side. Our findings suggest that the increased activity in the non-dominant FCR muscle, which is responsible for grasping, may be related to the specific support needs for non-dominant forearm functions, such as grasping, during substance use processes like procurement, preparation, and usage.

Traditional models state that language processing occurs in specialized brain areas, such as the Broca and Wernicke areas, as an abstract, rule-based system (Pulvermüller, 2005). However, recent neuroimaging evidence shows connections between language areas like the dorsal/ventral premotor cortex and the left inferior frontal (Broca's area) and superior temporal (Wernicke's area), suggesting potential information flow between cortical systems for language and motor action (Pulvermüller, 2005). Recent theories of embodied language processing propose that brain structures traditionally linked to perceptual and motor processes are also involved in processing language related to perception and action (Hauk et al., 2004).

According to research, the processing of verbal materials can engage neural structures associated with motor control for

Table 2.

Analysis of the Individuals' Basal EMG Activities and EMG Activation during Exposure to Substance-Related Topics

N = 16	Basal Level EMG		EMG Activation During Exposure to SRT		p	Z	Effect Size
	Mean ± SD	Min – Max	Mean ± SD	Min – Max			
Brachioradialis-right	1.41 ± 1.31	0.19 – 5.15	10.02 ± 7.65	2.47 – 34.30	<.001	–3.516	1.372
Brachioradialis-left	1.48 ± 1.15	0.30 – 4.78	9.66 ± 6.90	3.54 – 28.00	<.001	–3.516	1.350
Flexor carpi ulnaris-right	3.67 ± 2.99	0.03 – 9.89	11.54 ± 6.48	3.45 – 24.80	<.001	–3.517	1.385
Flexor carpi ulnaris-left	2.69 ± 2.50	0.70 – 9.66	9.63 ± 4.20	3.47 – 16.40	<.001	–3.517	1.821
Flexor carpi radialis-right	2.34 ± 1.96	0.30 – 7.03	7.94 ± 3.05	4.01 – 14.00	<.001	–3.517	1.761
Flexor carpi radialis-left	2.30 ± 1.72	0.42 – 5.74	9.18 ± 3.91	3.54 – 16.90	<.001	–3.516	2.532
EXD-right	4.75 ± 3.69	1.13 – 12.90	13.84 ± 9.96	5.67 – 41.20	<.001	–3.516	1.039
EXD-left	5.15 ± 3.97	1.15 – 13.10	12.20 ± 6.32	4.65 – 26.40	<.001	–3.517	1.318

Note: EMG = Electromyography; EXD = Extensor digitorum; N = Number; SD = Standard deviation; SRT = Substance related topic.

action verbs, even when individuals are concurrently involved in distracting tasks (Hauk et al., 2004; Pulvermüller, 2005). In a study involving the passive reading of action words such as “lick,” “pick,” or “kick,” functional magnetic resonance imaging revealed that reading these words activates specific structures (left inferior frontal cortex, motor cortex, and premotor cortex) similar to those engaged during the actual performance of corresponding movements (Hauk et al., 2004). Several studies using electroencephalography and magnetoencephalography have indicated that the pattern of activation in the cortex when processing action verbs related to concrete actions corresponds to the cortical representation of the action indicated by the word (Hauk et al., 2004; Shtyrov et al., 2004).

In our study, we found that when participants discussed their substance use experiences, there was increased activity in the motor cortices and relevant muscles, even though they were not intentionally imagining physical movements. This raised the question of why the increase in muscle activation when talking about substance use was more significant compared to other past physical activities, like work. This could be because people used more action-oriented words when discussing their substance use or because it triggered cravings.

When a person uses drugs, their brain may link certain cues, like where they use the drug or who they use it with, to the effects of the drug. This can cause the person to pay more attention to these cues and automatically feel a stronger urge to use the

drug when they encounter them, even if they are not aware of it (Fridland & Wiers, 2018). This automatic and rapid response to drug-related cues is known as drug approach bias. It is a common phenomenon among people who use substances like drugs or alcohol (Field et al., 2013; Fridland & Wiers, 2018). As per the drug approach bias model, approach behavior is seen as an integral part of the desire to use drugs rather than a separate and independent response (Fridland & Wiers, 2018). In this context, the rise in EMG activation in the forearms while participants discuss their substance use histories may indicate their conscious or unconscious drug cravings and implicit drug-seeking or usage behaviors that can be gauged through forearm muscles.

People often use gestures when describing their mental images (Hostetter & Alibali, 2008). Gestures made during speech are spontaneous movements of the hands and arms that closely represent the meaning in the accompanying speech. Various gestures involving hand and arm movements are widely accepted as valid evidence of the bodily representations of language and cognition (Hostetter & Alibali, 2008). Gestures directly convey spatial or motor features rather than through verbal or propositional codes (Morsella & Krauss, 2004).

When someone says, “Turn left after the light” while moving their hand to the left, this gesture helps convey the concept of “left” and reflects the speaker’s mental image. Research indicates that gestures work with speech to facilitate communication about mental images (Hostetter & Alibali, 2008). The lexical access hypothesis

Table 3.

Comparison of the Differences between Basal Level and Exposure to Substance-Related Topics of Dominant and Non-Dominant Forearm EMG Activities

N = 16	Right		Left		p	Z
	Mean ± SD	Min – Max	Mean ± SD	Min – Max		
Brachioradialis	8.61 ± 7.22	0.71 – 30.98	8.18 ± 6.63	2.43 – 26.61	.756	–0.310
Flexor carpi ulnaris	7.87 ± 5.25	1.78 – 17.90	6.94 ± 2.99	2.62 – 12.07	.959	–0.052
Flexor carpi radialis	5.60 ± 2.76	2.62 – 11.23	6.88 ± 3.83	1.93 – 12.69	.109	–1.603
Extensor digitorum	9.09 ± 8.21	4.40 – 30.93	7.05 ± 3.85	1.84 – 15.47	.326	–0.982

Note: N = Number; SD = standard deviation.

suggests that people use more gestures when word retrieval is difficult (e.g., when trying to name something challenging or unfamiliar). Conversely, speech becomes less fluent when gestures are prohibited (Morsella & Krauss, 2004). In our study, participants were asked to refrain from making gestures while discussing their substance use experiences, which resulted in suppressed gestures that would normally accompany their speech. This suppression may have caused implicit muscle activation in both forearms. However, the significant increase in activation during conversations unrelated to substance use, compared to those related to substance use within the same timeframe, suggests that other factors may contribute to this phenomenon.

Our study on embodied cognition in SUD revealed significant findings but had some limitations. These included a small sample size of 16, which may affect the generalizability of the results. The focus on forearm EMG responses to conversational cues may only partially represent SUD's broader embodied cognition responses, potentially missing other manifestations of substance cravings. The absence of a non-SUD control group also hinders our ability to determine if the observed EMG activations are specific to SUD. Furthermore, the study's cross-sectional design limits our ability to conclude causality or changes in embodied cognition responses over time. This suggests a need for more extensive, diverse, and longitudinal studies to deepen our understanding of these phenomena.

In summary, the significant increase in EMG activation observed when discussing substance-related topics suggests a potential connection between conscious or unconscious motor imagery and the conversation content, language processing, or substance cravings. A complementary study involving individuals in remission from substance use could help determine if these EMG responses indicate latent cravings associated with SUD. This study hypothesizes that the cravings experienced by individuals with SUD may be subconsciously expressed through forearm muscle activations. It's important to note that participants were unaware of the study's objectives and received no guidance or instructions that might influence their focus on motor-related activities. Conversely, they were explicitly instructed to remain still, supporting our belief that the recorded muscle activation patterns were not due to intentional motor preparation or execution.

In future research focusing on embodied cognition in SUD, it is important to include a wider range of participants and larger sample sizes to ensure more comprehensive results. Additionally, incorporating control groups without SUD is crucial for comparison, and expanding muscle activity monitoring to areas beyond the forearms will provide a more detailed view of embodied cognition responses. Longitudinal studies can help in understanding changes in EMG activity over time, especially in relation to treatment interventions. Further exploration into the roles of motor imagery and substance use cravings, as well as the impact of language processing on EMG responses, could yield significant insights. The utilization of advanced EMG analysis techniques, such as wavelet analysis or machine learning, may reveal more intricate data patterns. Comparative studies across different substance types could shed light on the distinct effects of various substances on embodied cognition. Lastly, investigating the potential preventive and therapeutic applications of

understanding embodied cognition responses in SUD could lead to the development of new treatment approaches, advancing both theory and practice in the field.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

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ORIGINAL ARTICLE

The Moderating Effect of Social Emotional Learning Skills Between Differentiation of Self and Technology Addiction in Adolescents

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Main Points

- The current study examines the relationships between differentiation of self, social – emotional learning (SEL) skills, and technology addiction.
- First of all, it was determined that self-differentiation and technology addiction in adolescents were negatively related.
- The results show that differentiation of self in adolescents is related to SEL skills.
- Social – emotional learning has a moderating effect on the relationship between self-differentiation and technology addiction.
- The current study shows that developing the self through SEL may be a reliable and practical way to effectively address the problem of technology addiction in adolescents.

Abstract

The aim of this study is to examine the moderating effect of social emotional learning skills between differentiation of self and technology addiction in adolescents. The research was conducted with high school students in a city center in Central Anatolia in the 2022 – 2023 academic year. A total of 608 high school students, 404 girls and 204 boys, participated in the research. The average age of the participants is 15.5. Differentiation of Self, Technology Addiction, and Social Emotional Learning Skills Scale were used as measurement tools. Pearson correlation coefficient and regression analyses were used to analyze the data obtained. The Process Macro (model-1) was used to determine the moderation effect in data analysis. As a result of the correlation analysis, it was seen that there was a significant relationship between differentiation of self, social emotional learning skills and technology addiction in adolescents. According to the moderator analysis results, it was seen that self-differentiation in adolescents predicted technology addiction and social emotional learning skills had a moderating effect between self-differentiation and technology addiction in adolescents.

Keywords: Adolescence, differentiation of self, social emotional learning skills, technology addiction

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Introduction

Adolescence is a period in which the individual experiences rapid changes in physical, cognitive, emotional, and social areas (Steinberg, 2007), and is marked by the acquisition of identity, autonomy, and productivity (Parlaz et al., 2012). It is a critical developmental process. While the formation of a positive identity and sense of self in the adolescent makes

experiences positive, a negative sense of identity can pave the way for the emergence of behavioral problems. Especially, the role confusion experienced in identity acquisition causes conflicts and problems in family and friend relationships; it can cause internalized symptoms such as introversion, loneliness, reluctance, fear of being disliked, and disapproval (Parlaz et al., 2012). Especially in this period, the increase in emotional problems and the use of the internet and



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social media have come to the fore in recent years as a means of coping with these problems. It is seen that the correct use of technology makes life much easier, but some negative behaviors such as ‘addiction’ occur due to uncontrolled and excessive use (Ryan et al., 2014). Social media and internet addiction threaten adolescents the most today (Echeburua & De Corral, 2010). Internet and social media are at the center of the daily lives of adolescents who are searching for identity and trying to know themselves. The literature shows that there is a negative relationship between self-differentiation and technology, social media, and internet addiction (Park & Park, 2017; Sotero et al., 2019). However, there is a paucity of information about how technology and social media use during adolescence affects social and emotional functions (Vannucci & Ohannessian, 2019), and it is thought that the excessive use of technological devices may be related to individuals’ social – emotional learning (SEL) skills. As a matter of fact, during the screenings, studies were found that demonstrated a negative relationship between SEL skills and Facebook addiction (Aftab et al., 2015) and internet addiction (Oh & Park, 2016).

In recent years, the increase in research on technology, internet, and social media addiction is important in terms of determining the dynamics affecting addiction and intervention studies. However, it is thought that a more detailed investigation of SEL skills, which are believed to affect the development of healthy self-differentiation in adolescent individuals, may contribute to the literature. For this reason, in this study, considering that there is a relationship between differentiation of self and technology addiction in adolescents, the moderating effect of SEL skills on these variables was investigated.

Literature Review

Technology Addiction

Behavioral addiction, which does not involve chemical addiction but involves machine – human interaction, is defined as technology addiction (Arisoy, 2009). Digital games that support and affect technology addiction include active behaviors such as internet and social media use or passive behaviors such as television. While some researchers in the literature mention that the use of technology contributes to adolescent development (Yıldırım, 2014), on the contrary, some argue that it may pose a risk for the adolescent as virtual relationships replace real relationships in the identity formation process (Odacı & Çıkrıkçı, 2017). However, although their purposes of use vary, it is reported that the popularity of internet and social media applications, which are easy to use and do not require any cost, is increasing day by day among adolescents (Elitaş, 2020). In a study conducted with adolescents aged 14 – 17 in seven European countries (Tsitsika et al., 2014), they determined that the risk of internet addiction was 12.7% and the prevalence of internet addiction was 1.2%. This situation is similar in Türkiye. It points out that internet usage in Türkiye is 59.6% in the 16 age group (TÜİK, 2018). Another study revealed that more than 85% of adolescents aged 12 – 17 are social media users and that these young people prefer to use social media instead of face-to-face communication (Elmalı, 2020). Evidence shows that internet and social media addiction rates have reached alarming levels. Therefore, in this study, one of the variables considered and thought to be an explanation of internet and social media addiction is the concept of differentiation of self in adolescent individuals.

Differentiation of Self in Adolescents

Bowen (1978) conceptualizes adolescence as the period in which individuals reach a more differentiated or mature self. Differentiation is a process that involves intrapsychic and interpersonal components that exist to balance the individual’s two dialectical life forces (autonomy and healthy relationships with others). This concept, which is also described as separation-individuation in the context of self and is necessary for the development of the individual, involves two different progressions that interact with each other and include different symptoms and behaviors. Separation refers to the child’s separation from the common life phase with his/her mother, while individuation refers to the child’s separation from the common life phase, becoming aware of his/her own distinctive features and achieving gains in this regard. The child’s separation from his parents is associated with self-knowledge and awareness. The process allows the adolescent to create a unique sense of self (Sabaka, 2009). According to Bowen’s family systems model (Kerr & Bowen, 1988), self-differentiation is based on the individual’s development of self-regulation capacity in internal and interpersonal dimensions. Self-differentiation in the internal dimension involves regulating emotional reactivity in order to establish prosocial and intentional relationships with others; in the interpersonal dimension, it includes the ability to create a solid and flexible sense of self while maintaining closeness and relationships with people. According to Bowen (1978), highly differentiated individuals can establish relationships with other people without losing their sense of self, convey their emotions to other individuals in a balanced manner, and maintain healthy interpersonal relationships (Kerr & Bowen, 1988). In addition, differentiated individuals are adaptable and flexible, successful in coping with stress, and maintaining a sense of autonomy in their relationships, as well as functioning on an emotional and rational level (Duch-Ceballos et al., 2021). On the contrary, people with low self-differentiation tend to become entangled with others or experience emotional detachment (Kerr & Bowen, 1988). They depend on others in their actions and have difficulty taking action by thinking on their own, without the opinions of others. According to some researchers, extraordinary life experiences and therapeutic efforts to increase differentiation may cause some changes in differentiation (Kerr & Bowen, 1988). In this context, another concept discussed in this study and thought to have an impact on the healthy self-differentiation of adolescents is SEL skills, which have been developing since childhood.

Social – Emotional Learning Skills

Social – emotional learning is expressed as developing skills such as knowing the individual’s weaknesses and strengths, recognizing their own emotions and the emotions of others, regulating and expressing emotions, and establishing and maintaining effective communication (CASEL, 2020). Social – emotional learning skills were first put forward by the CASEL organization (Collaborative to Advance Social and Emotional Learning), which took action in 1994. Social – emotional learning refers to the multifaceted development of the individual and helps the individual cooperate and learn effectively; it is defined as the whole of abilities such as self-esteem, coping with stress, problem solving, and communication, which have an important share in success in business, society, and family life and support academic success (Elias et al., 2006). Social emotional learning

skills were discussed in five dimensions. These are effective decision-making, self-awareness, social awareness, self-management, and relationship skills. These dimensions emphasize the importance of developing individual competencies such as interpersonal skills and social awareness. The social content of these skills includes developing positive relationships and maintaining developing relationships, and the emotional content includes self-awareness and cognition and thought of emotions within the self (Merrell & Gueldner, 2010). These skills enable adolescents to feel valued, to be aware of their feelings and needs, and to develop a positive self-image by making them aware of their own characteristics (Apaydin Demirci et al., 2022). An increasing number of studies show a negative relationship between self-esteem and internet and social media addiction (Malo-Cerrato et al., 2018), as well as a negative relationship between SEL skills and Facebook (Aftab et al., 2015) and internet addiction (Çeliker, 2020). It reports that there is a relationship. Therefore, it is assumed that SEL skills have a regulatory role in the relationship between self-differentiation and technology addiction in adolescents.

Current Study

In recent years, there has been a remarkable change and transformation in interpersonal communication, especially with technological developments in access to information and the rapid proliferation of social media platforms (WhatsApp, Facebook, Instagram, or Twitter). In the social process, social interaction with people contributes to the adolescent individual's personality development and self-perception formation. However, due to the influence of technology, the decrease in face-to-face communication between people and the gradual transfer of communication to the virtual environment cause the social and emotional structure of individuals to deteriorate. Increasing technology addiction among adolescents is associated with many maladaptive developmental outcomes and therefore raises concern in many countries. For this reason, examining the variables that can be associated with technology addiction will undoubtedly support the identification, prevention, and treatment processes of the problem. In addition, a structural model testing the mediation of SEL skills in the relationship between self-differentiation and internet and social media addiction in adolescents has not been found in the literature. It is thought that this study will contribute to the literature in this respect. It is expected that the findings obtained as a result of the research will guide and serve as a resource for psychological counselors in psychotherapeutic intervention studies with adolescents. In this study, a model was created that suggests that SEL skills have a moderating effect on the relationship between differentiation of self and technology addiction in adolescents. In this context, answers were sought to the following research questions:

H₁. There are significant relationships between self-differentiation, technology addiction and SEL skills in adolescents.

H₂. Social emotional learning skills have a regulatory role between self-differentiation and technology addiction in adolescents.

Within the scope of moderator analysis, the research model was created as follows (Figure 1):

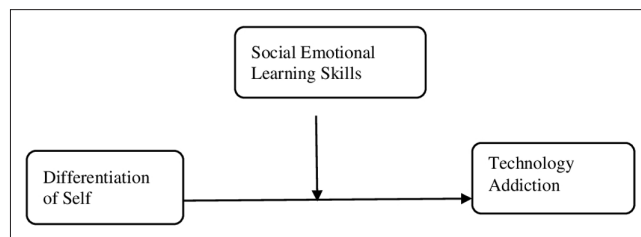


Figure 1. Moderated/Conceptual Model.

Material and Methods

Participants

The research was conducted in secondary schools located in a city center in the Central Anatolian region of Türkiye. A total of 608 adolescents who met the inclusion criteria and volunteered to participate in the study were included. Of the participants, 404 (66.4%) of the participants were female, and 202 (33.6%) were male. The ages of the participants ranged from 13 to 18 (Mean: 15.53). The literature suggests that a sample size of at least 384 is required for populations consisting of a large number of individuals (Pourhoseingholi et al., 2013). The aim of this study was to reach 384 adolescents, and the study was conducted with 608 adolescents. The convenience sampling method was used in sample selection (Table 1).

Instruments

Social and Emotional Learning Scale in Adolescents

It was developed by Totan (2018) to measure the emotional and social learning skills of adolescents. The test is a 5-point Likert type and consists of 23 items and a five-factor structure. Within the scope of the scale, the minimum score is 23 and the maximum is 115. A high score on the entire scale indicates a high level of SEL skills. When the factor loadings of the dimension items are examined, the self-awareness dimension is between 0.47 and 0.81, the responsible decision-making dimension is between 0.46 and 0.84, the social awareness dimension is between 0.51 and 0.77, the self-control dimension is between 0.60 and 0.75, and the relationship skills dimension is between 0.46 and 0.84. It was determined that it varied between 0.47 and 0.75. Within the scope of the reliability studies of the scale, the Cronbach α coefficient calculated for the total test was found to be 0.92. Cronbach's α value for the entire scale for the study was calculated as 0.85.

Digital Addiction Scale

The test was developed to measure the level of digital addiction in individuals (Arslan et al., 2015). It is a 29-item Likert-type scale rated from 1 to 5. The highest score on the test is 145, and the lowest score is 29. High scores on this scale indicate a high tendency towards digital addiction is high. Cronbach's α value of the digital addiction scale was determined to be 0.89. Cronbach's α value for the entire scale for the study was calculated as 0.90.

Differentiation of Self Short Form

The inventory (BFE-KF) was developed to determine the self-differentiation levels of individuals (Drake et al., 2015) and the scale adaptation was made by (Sarıkaya et al., 2018). It consists of a total of 20 items and four subscales: taking an ego position, emotional reactivity, emotional detachment, and enmeshment. In adaptation studies of the scale, Cronbach's α internal consistency

Table 1.
Socio-Demographic Data

Variables	%	<i>n</i>	Variables	(%)	<i>n</i>
Sex			Father educational level		
Male	33.6	204	Primary school	14.6	89
Female	66.4	404	Elementary school	22.4	136
Age (13 – 18)	Mean	15.5	High school school	33.1	201
Grade level			Undergraduate/associate degree	29.9	182
9	43.9	267	Mother educational level		
10	32.4	197	Primary school	23.5	143
11	23.7	144	Elementary school	24.5	149
Perceived income level			High school school	32.07	195
Low	5.9	36	Undergraduate/associate degree	19.9	121
Medium	80.6	490			
High	13.5	82			

coefficients were calculated as 0.61 for the ego-taking dimension, 0.80 for the emotional reactivity dimension, 0.78 for the emotional detachment dimension, 0.70 for the enmeshment dimension, and 0.83 for the whole scale. Each item in the scale receives a score between 1 (does not reflect me at all)—6 (reflects me very much). It consists of three items for emotional detachment, six items for emotional reactivity, five items for enmeshment, and six items for self-position. In the study, Cronbach's α value for the entire scale was calculated as 0.79.

Socio-Demographic Data Form

This form was developed to determine socio-demographic data. This form includes information such as sex, grade level, age, parents' education level, and perceived income level.

Collection of Data

Necessary legal permissions and official research approval were obtained from the Ethics Committee of Niğde Ömer Halisdemir University Ethics Committee Commission (Decision No: 08/03, Date: 01.06.2023) to collect research data. In this context, the scales were administered to students by researchers in the fall semester of the 2022 – 2023 academic year. During data collection, the purpose of the research was explained to school administrators and students, and care was taken to provide an appropriate environment and time for them to answer the scales. After the necessary explanations for the surveys were made, the tests were filled out by the students under the supervision of the authors, and the answering process took an average of 45 minutes.

Data Analysis

The current study aimed to determine the relationships between predictor and moderator variables. In this context, first the homogeneity of the data was checked, and then the correlational relationships between the variables were tested. The skewness value (−0.09 to 0.07) and kurtosis value (−0.38 to 0.24) in this data set were found, and since these data were close to ± 1 , it was seen that the distribution was normal (Tabachnick & Fidell, 2013). According to the Mahalanobis technique, 14 data points with extreme values were identified and removed from the data set. Then, correlation analysis was conducted to determine

whether there was a significant relationship between differentiation of self, technology addiction and SEL skills in adolescents. Finally, the moderating effect of SEL skills between differentiation of self and technology addiction was examined. In moderation analysis, the *Z* variable has a power that affects the strength of the relationship between *X* and *Y*. Moderation analysis was conducted with Process Macro (Model 1) (Hayes, 2013) and this relationship was accepted as $p < .05$. At the end of the study, the power of the study was calculated as 0.99 in the power analysis performed with GPower.

Ethical Considerations

Ethics Committee approval was obtained from Ethics Committee of Niğde Ömer Halisdemir University Ethics Committee Commission (Decision No: 08/03, Date: 01.06.2023) and necessary permissions were obtained from the relevant institutions for this study. The study was conducted in accordance with the Declaration of Helsinki. Informed consent forms were obtained from adolescents and their parents before the study. Before the research, students were informed that filling out the survey was voluntary and that the data would be used only for scientific purposes.

Results

Preliminary Analyses

Correlation analysis results revealed that there is a negative and significant relationship between self-differentiation and technology addiction in adolescents. Additionally, there is a positive and significant relationship between differentiation of self and SEL skills. However, it was determined that technology addiction and SEL skills were negatively related (Table 2).

Moderation Analysis

In the next stage, the regulatory effect was tested using Model-1 (Hayes, 2013). At this stage, differentiation of self (*X*) in adolescents was defined as a predictor. Social-emotional learning acts as a moderator (*M*) and technology addiction in adolescents is the outcome (*Y*) (Figure 2). Conducting moderation analysis showed that adding a moderator variable between differentiation

Table 2.
Correlations ($H_{1,2}$)/Descriptive Statistics

Variables	DS	TA	SEL	X	SD	Skewness	Kurtosis
DS	1			70.29	16.23	-0.02	-0.30
TA	-0.211*	1		84.80	20.68	0.07	-0.24
SEL	0.131*	-0.197*	1	80.91	12.58	-0.09	-0.38

Note: DS = Differentiation of self; SEL = Social emotional learning skills in adolescents; TA = Technology addiction.

* $p < .001$.

of self and technology addiction in adolescents had a 1% effect on the variance of SEL (Table 3). This demonstrated that SEL makes a significant contribution. This study used 5000 bootstrapped resamples with a 95% CI. If there is no zero in the CI, it can be said that there is a significant moderating effect. Moderation analysis results show that adolescent individuals with higher SEL skills affect the relationship between self-differentiation and technology addiction in adolescents more than those with lower SEL skills (Figure 2). In other words, individuals with higher SEL skills show less technology addiction and show us that self-differentiation may be greater. According to these results, it can be said that increasing the SEL skills of adolescent individuals, who are going through a critical period in terms of development, can make significant contributions to developing a healthy self-differentiation and moving away from technology addiction.

Discussion

The intensive use of technological tools and equipment affects the self-development and social and emotional skills of individuals, especially during the adolescent development period. For this reason, this study aimed to examine the moderating effect of SEL skills between self-differentiation and technology addiction in adolescents. According to the research findings, it was first determined that there was a negative relationship between the differentiation of self and technology addiction in adolescents. When the literature is examined, this finding is supported by previous similar studies (Park & Park, 2017; Sotero et al., 2019). Sotero et al. (2019) revealed that low self-differentiation

is associated with a higher level of Facebook addiction in adolescents. In their study, Park and Park (2017) determined that as self-differentiation increases, students' smartphone addiction decreases. According to Bowen, individuals with a high level of differentiation can manage their anxiety better, use social problem-solving skills more effectively, and experience fewer physical, emotional, and social symptoms in their lives (Bowen, 1978). It is also mentioned that individuals with a high level of self-differentiation have emotional intelligence, which includes appreciating their inner knowledge and emotions while recognizing and empathizing with the emotions of others. Therefore, the research and theoretical explanations seem to support the results of this research. In this case, it can be said that the development of self-differentiation in adolescence is an important variable affecting technology addiction.

Another finding of our study is that the differentiation of self in adolescents is related to SEL skills. Merter (2013) found in his study that there is a significant and positive relationship between the social skills of young people with high self-esteem. In this context, positive self-development ensures that the individual's social relationships progress in a positive direction (Harris & Orth, 2020). Current scientific literature explains SEL skills as vital skills that enable adolescents to manage emotional processes correctly, enjoy the relationships they establish in social life, and improve the quality of life (Merter, 2013; Apaydin Demirci et al., 2022). It is suggested that these skills will help adolescents develop a positive self-image by making them feel valuable and aware of their feelings and needs (CASEL, 2020). In addition, research findings showing a decrease in undesirable behaviors as a result of improving SEL skills are frequently encountered in the literature. For example, in the study conducted by Durlak et al. (2010), it was determined that as a result of increasing students'

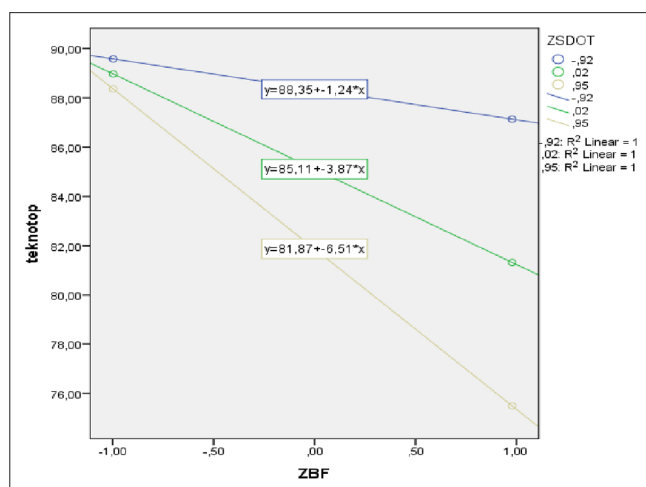


Figure 2. Association Between Technology Addiction and Differentiation of Self as Moderated by the Social Emotional Learning (H_3).

Table 3.
Moderation Analysis Results

Model 1 (Technology Addiction)				
Predictors	β	t	SE	95% CI
Constant	85.17	105.21***	0.81	83.58 86.76
DS	-3.83	-4.66***	0.82	-5.44 -2.22
SEL	-3.47	-3.97***	0.88	-5.19 -1.75
DS $\times$ SEL	-2.83	-3.19***	0.89	-4.57 -1.09
R^2			0.08	
F			19.748***	

Note: DS = Differentiation of self; SEL = Social emotional learning skills in adolescents.

*** $p < .001$.

SEL skills, self-perception and positive social behaviors increased significantly and problematic behaviors decreased. Therefore, it can be said that social emotional skills play an important role in positive self-differentiation in adolescence.

Another hypothesis of the research is to examine the moderating effect of SEL skills on the relationship between differentiation of self and technology addiction. According to the results obtained from the analyses, it was concluded that SEL skills moderated the relationship between differentiation of self and technology addiction in adolescents. According to the resulting data, individuals with higher SEL skills are positively affected by self-differentiation and tend to be less technology addicted. Little is known about individuals' social media usage patterns during adolescence and how these patterns affect their social and emotional functions (Vannucci & McCauley Ohannessian, 2019).

However, it is suggested that the level of technology and social media usage may be related to individuals' SEL. For example, Aftab et al. (2015) determined in their study with high school students that internet and Facebook addiction negatively predicted SEL at a significant level. Similarly, Raiisi et al. (2020) documented in their study that there is a significant negative relationship between internet addiction and social skills and emotional intelligence. Again, Chen et al. (2021) determined that SEL competence and problematic internet use were negatively related, and ultimately demonstrated the necessity of developing SEL programs to reduce internet abuse in adolescents.

In line with the results of this study, it can be said that increasing the SEL skills of adolescent individuals, who are going through a critical period in terms of development, can make significant contributions to developing a healthy self-differentiation and moving away from technology addiction. In this sense, it can be stated that, in order to prevent or eliminate technology addiction, which is one of the most important problems of today, individual or group psychological counseling practices aimed at increasing the SEL skills of children and adolescents in schools can make significant contributions to adolescent individuals who are going through an intense development process. It is recommended that awareness studies with broader participation be conducted in schools, especially by school psychological counseling and guidance services, on self-integrity, technology use, and social and emotional skills. In addition, preventive and therapeutic individual psychological counseling practices can be very useful for students who have developed an addiction to technology. Furthermore, it can be said that family counseling practices and preventive psychological counseling studies can make significant contributions to supporting identity and self-development during adolescence and contributing to the separation from the family and differentiation of the self.

The results of the study in question should be carefully considered within the framework of its limitations. First of all, the data of the study were collected from a limited number of participants who attended high school in a city center in Central Anatolia in the 2022 – 2023 academic year. For this reason, the results obtained from this study can be generalized to participants with similar characteristics. However, in today's world, where the use of technology spreads very quickly and life changes very rapidly,

conducting similar research in different subcultures in Türkiye and in different parts of the world can make significant contributions to the literature in terms of comparing the results. In addition, this study focused on adolescents with a cross-sectional research method. Conducting longitudinal studies where we can observe the effects of the study in different developmental periods can also provide important findings about the course of the problem over time.

Data Availability Statement: Data supporting the results of the present study will be made available from the corresponding author upon reasonable request.

Ethics Committee Approval: Ethics committee approval was obtained from the Niğde Ömer Halisdemir University Ethics Committee Commission (Decision No: 08/03, Date: 01.06.2023).

Informed Consent: Written informed consent was obtained from the from the participants and parents of the participants who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – B.L., S.K.; Design – B.L., S.K.; Supervision – B.L., S.K.; Resources – B.L., S.K.; Materials – B.L., S.K.; Data Collection and/or Processing – S.K., B.L.; Analysis and/or Interpretation – S.K., B.L.; Literature Search – B.L., S.K.; Writing – B.L., S.K.; Critical Review – B.L., S.K.

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ORIGINAL ARTICLE

The Correlation between Problematic Media Use and Executive Functions in Preschool Children

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Main Points

- There is a negative relationship between EFs and problematic media use.
- As children's TV viewing time increases, their problematic media use increases.
- Problematic media use predicts working memory and inhibitory control skills.

Abstract

The aim of this study is to determine whether or not preschool children's TV watching time and problematic media use are predictors for the working memory and inhibitory control components of executive functions (EFs). The participants, 418 mothers, answered questions about TV watching time, problematic media use, as well as working memory and inhibitory control components of EFs for their children (4-6 years old). The findings of the study revealed that problematic media use had moderately negative significant correlations with working memory and inhibitory control. Furthermore, TV watching time and problematic media use predicted working memory and inhibitory control. Accordingly, the problematic media use of the children accounted for 29% of the total variance in working memory and 27% of the total variance in inhibitory control. These findings shed light on the correlation between problematic media use and EFs in preschool children.

Keywords: Inhibitory control, preschool period, problematic media use, television, working memory

Introduction

Today, digital media plays a significant role in family life (McDaniel & Coyne, 2016). Many children begin interacting with media tools during their infancy (Rideout, 2017). Their screen exposure has increased with the discovery of media tools, particularly television. This leads to questioning the possible effects of media on child development (Drotner, 2013). The studies have revealed that excessive use of digital media tools in preschool period is associated with delays in cognitive, linguistic, social, emotional, and motor development of children (Pagani et al., 2010). Factors causing these results are that screen time of children has increased, they do not watch age-appropriate content, parent-child interaction has decreased, and they excessively use social media (Hinkley et al., 2014). Screen media

exposure at early ages and the abovementioned factors negatively affect the executive processes that identify a series of cognitive functions of children (Nathanson et al., 2013). Given the important role of executive functions (EFs) for lifelong adaptation, the current study examined how children's problematic media use and TV watching time were correlated with working memory and inhibitory control components of EFs in a population including mothers with children (48 – 72 months old) in Türkiye.

Literature Review

Executive Functions in Preschool Children

Executive functions are sophisticated, complicated behavioral and metacognitive self-regulation abilities supported by neural networks in the brain,

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such as planning, directing attention, inhibitory control, emotional control, self-monitoring, and response inhibition (Hughes et al., 2009). In other words, EF is an umbrella term used for a set of interrelated cognitive functions that regulate and coordinate other cognitive processes, drive the dynamics of human cognition, and enable people to achieve their aims (Welsh et al., 1991). Three main components of EF are inhibitory control, cognitive flexibility, and working memory (Miyake et al., 2000). Inhibitory control refers to the ability to focus on the main task by inhibiting natural but unnecessary thoughts and/or behaviors that interfere with completing tasks in daily life. Working memory refers to the ability to retain and manipulate information. Cognitive flexibility refers to the ability to flexibly change perspectives, focus of attention, or response maps. Studies have revealed that the most significant changes in the development of the main EF components occur between the ages of three and five (Marcovitch & Zelazo, 2009). Furthermore, it is stated in the literature that EF has an important role in achieving successful social and cognitive functioning and acquiring basic academic abilities (Ponitz et al., 2009). Moreover, the level of motor competence, which includes both physical capacity and cognitive components, is highly associated with the improvement of EF from the preschool period (Malambo et al., 2022). Studies on EF and media use have reported that screen time and television watching are significant predictors of EF in preschoolers and increased screen time results in weaker EF (Nathanson et al., 2014).

Screen Exposure and Problematic Media Use in Preschool Children

As from infancy, the children's rate of media use increases rapidly (Rideout, 2017). During early childhood, children are reported to spend an average of 2–3 hours a day in front of a screen (McNeill et al., 2019). These findings suggest that children consume media intensively from an early age. Studies on the effects of screen exposure on child development have indicated that increased screen exposure is associated with poor sleep, inadequate school readiness (Fitzpatrick et al., 2012), increased sedentary behaviors, obesity, attention deficit (Swing et al., 2010), and inadequate social skills during infancy, early childhood, and adolescence (Hisler et al., 2020).

Children's exposure to media that can cause devastating effects on their development is examined as problematic media use (Domoff et al., 2020). Following DSM-5 criteria can be used to identify problems related to problematic media use in the literature; (a) preoccupation with screen media, (b) tolerance (or needing more screen media), (c) escape (i.e., using media to avoid or get rid of negative emotion), (d) loss of interest in other activities, (e) withdrawal (i.e., experience of psychological withdrawal when screens are denied access), (f) lack of control (overuse), (g) use-related psychosocial consequences, (h) cheating (hiding or lying use to access screens), and (i) serious problems from use (APA, 2013). Problematic media use may result in detrimental impacts in the social, behavioral, and/or academic fields. Depending on the problematic media use, the individual may retreat from social life by demonstrating a high tolerance for media tools (Domoff et al., 2019). Another study indicated that preschool children's problematic media use and early-onset screen exposure were correlated with poor EF (Nathanson et al., 2014). Based on studies,

it is regarded as essential to investigate the potential correlation between media use and EF in the preschool period.

Current Study

Today, children are surrounded by media tools. Increased media possibilities result in increased screen exposure in children. It is stated in the literature that excessive screen exposure is associated with various negative outcomes for children. Based on the current findings, this study aims to determine whether problematic media use and screen exposure predict EF in children aged 48–72 months. For this purpose, the research questions are as follows:

- Does problematic media use have any significant correlation with working memory and inhibitory control functions in 48–72-month-old children?
- Do problematic media use, working memory, and inhibitory control functions differ in 48–72-month-old children based on daily TV watching time?
- Does TV watching time predict working memory and inhibitory control in 48–72-month-old children?
- Does problematic media use predict working memory and inhibitory control in 48–72-month-old children?

Material and Methods

The cross-sectional study was designed based on the correlational survey model, which is one of the quantitative research methods. The correlational survey model intends to identify the existence and/or degree of covariance between two or more variables (Karasar, 2014). Correlational research, one of the correlational survey methods, is considered important because it enables higher analyses by identifying the level of correlation between the variables. The dependent variables of the study in this context are the “working memory” and “EFs” components of EFs. It was investigated whether or not each of these dependent variables varied according to the study's independent variables (gender, TV watching time, and problematic media use). Furthermore, the variables' presence and/or degree of covariance were investigated using the aforementioned valid and reliable assessment tools.

Participants

The sample group consisted of 440 women who were contacted through face-to-face interviews between May 1, 2022, and July 1, 2022, were residing in Türkiye and had 48–72-month-old children. The study was completed with a total of 418 mothers since 22 mothers, who filled out the data collection tools incorrectly, were excluded from the study. The participants were chosen using convenience sampling, one of the non-random sampling methods. The sample size determination table developed by Israel (1992) was used to establish the minimum sample size for the study. According to this table, it was determined that the minimum sample size to be taken from the population provided in the 5% sensitivity and 95% confidence interval must be 390. Table 1 shows the descriptive characteristics of the children and the parents.

Table 1 shows some descriptive characteristics of the children and mothers who participated in the study. As a result, the gender rates of the children were similar to each other. Mothers having 225 (53.8%) girls and 193 (46.2%) boys participated in the study. It can be asserted that the age distribution of the children

Table 1.
Distribution of Descriptive Variables of the Children and the Mothers (n = 418)

Variables		n	%
Gender of the child	Girl	225	53.8
	Boy	193	46.2
Age of the child	4 years	157	37.6
	5 years	138	33.0
	6 years	123	29.4
Educational level of the mother	Primary school	130	31.1
	High school	116	27.8
	university or higher	172	41.1
Employment of the mother	Employed	159	38.0
	unemployed	259	62.0
Age at which the child starts watching TV	0 – 1 year	73	17.5
	1 – 2 years	144	34.4
	2 – 3 years	97	23.2
	3 – 4 years	73	17.5
	4 – 5 years	18	4.3
	5 – 6 years	13	3.1
Daily TV watching time of the child	Never	50	12.0
	0 – 30 minutes	116	27.8
	31 – 60 minutes	122	29.2
	1 – 2 hours	86	20.6
	3 hours and more	44	10.5
Total		418	100.0

was similar. There were 157 (37.6%) children in the 4-year-old group, 138 (33.0%) in the 5-year-old group, and 123 (29.4%) in the 6-year-old group. When the findings regarding the age at which children started to watch TV were examined, it was determined that the children (34.4%) started watching TV mostly at the age of 1 – 2, followed by the ages of 4 – 5 (4.3%) and 5 – 6 years (3.1%), respectively. According to the information reported by the mothers, it was found that the children's TV watching time was mostly 31 – 60 minutes (29.2%), which was followed by 0 – 30 minutes (27.8%) and 1 – 2 hours (20.6%), and 3 hours and more (10.5%), respectively.

Data Collection Tools

Personal Information Form: The researchers prepared a personal information form to determine the socio-demographic characteristics of the participants. The form was completed by the mother of the child included in the study. It includes questions about the mother's education and employment status, the child's age and gender, the age at which the child began watching television, and the daily TV watching time.

Childhood Executive Functioning Inventory: Thorell and Nyberg (2008) developed the "Childhood Executive Functioning Inventory (CHEXI)" to assess the EFs of children aged 4 – 12. The original version of the scale consists of two subscales (working memory and inhibitory control) and a total of 24 items. It can be filled out by parents and teachers. The Turkish adaptation of the scale was conducted by Çiftçi et al., (2020). As a result of the validity and reliability study conducted with data obtained from a total of 754 children aged between 48 months 72 months, the two-factor structure of the five-point Likert-type scale with

24 items (1 = not at all, 2 = slightly true, 3 = moderately true, 4 = true, 5 = extremely true) was supported. The reliability coefficients for the subscales of the scale were calculated as 0.95 for the working memory subscale and 0.91 for the inhibitory control subscale. Test-retest reliability coefficients were found to be 0.89 for the working memory subscale and 0.85 for the inhibitory control subscale. High scores signify that the child displays more EF skills. In the current study, the Cronbach's alpha internal consistency coefficient was calculated as $\alpha = 0.933$ for the working memory subscale, $\alpha = 0.926$ for the inhibitory control subscale, and $\alpha = 0.964$ for the overall scale.

Problematic Media Use Measure: Domoff et al. (2019) developed the "Problematic Media Use Measure (PMUM)" to determine problematic media use in 4 – 11-year-old children. The original version of this five-point Likert scale (1 = never 5 = always) has a 27-item long form and a 9-item short form. The Turkish adaptation studies of the scale for the long and short forms were conducted by Furuncu and Öztürk (2020). The validity and reliability studies of the scale included 324 parents in the first stage and 213 parents in the second stage. As a result of its validity and reliability study, the reliability coefficients of the 27-item long version and the 9-item short version were calculated as .97 and .92, respectively. High scores indicate problematic use. In the current study, the Cronbach's alpha internal consistency coefficient of the scale was calculated as $\alpha = 0.978$.

Ethical Considerations

Ethical considerations were paid attention to throughout the current study. Permission from the authors who developed or adapted the scales was sought to use them in the study. Before the study, ethical approval (dated 26.10.2022 and numbered 2022/36) was obtained from the Non-Invasive Clinical Trials Ethics Committee of Aydın Adnan Menderes University, Faculty of Health Sciences. Then, mothers who completed the informed consent form within the scope of the study were asked to complete the personal information form, the Problematic Media Use Measure, and the Childhood Executive Functioning Inventory for their children.

Data Analysis

The IBM SPSS 25 (IBM SPSS Corp.; Armonk, NY, USA) program was used to analyze the data. In the first stage, it was checked whether the values of each variable were within their possible ranges and whether there was any missing data. In the second stage, the normal distribution of the variables was checked using descriptive statistics (reviewing the mean and trimmed mean values), and the patterns of the distributions were examined using skewness and kurtosis coefficients, and Histogram, Normal Q-Q Plot, Detrended Normal Q-Q, and box plots. It was determined that the skewness values of the total scores of the scales used in the study ranged between -0.157 and 0.743 and the kurtosis values ranged between -0.146 and -0.503 . Since the skewness and kurtosis values of the total scores in the scales were in the range of -1 to $+1$, it was determined that the scale scores were normally distributed (Hair et al., 2013). For this reason, the analyses were carried out using parametric methods. In this framework, one-way analysis of variance (ANOVA) was used to examine the difference in TV watching time. In cases where there was a significant difference between the groups according to the results

of one-way ANOVA, multiple comparison tests (post-hoc tests) were used to determine between which groups these differences existed. For the hypothesis of determining whether there is a correlation between the variables, the assumptions of linearity and covariance were checked over the scatter plots, and the presence of any correlation between the variables was examined with Pearson's Product Moments correlation coefficient. In addition, whether the variables of problematic media use and TV watching time, as independent variables, have a role in working memory and inhibitory control was tested with simple and multiple linear regression analyses. Prior to the regression analysis, antecedents such as sample size, multicollinearity and uniqueness, extreme values, normality, linearity, covariance, and independence of residuals were checked. As a result of this control, it was determined that the assumptions were met. A significance level of $p < .05$ was applied in all analyses.

Results

The results, showing how children's problematic media use and TV watching time were correlated with working memory and inhibitory control components of EFs in a population of mothers having 48 – 72-month-old children in Türkiye, are presented in tables.

Pearson's correlation analysis was employed to test the correlation between the scales utilized in the study, as shown in Table 2. Accordingly, as a result of the analysis, a statistically significant negative correlation was found between the working memory ($r = -0.541, p < .05$) and inhibitory control ($r = -0.523, p < .05$) subscales of CHEXI and PMUM. According to these results, high levels of problematic media use are associated with low levels of EF (working memory and inhibitory control).

When Table 3 was examined, it was observed that the ANOVA test was used to determine whether there is a significant difference in problematic media use, working memory, and inhibitory control based on TV watching time. Analysis results (Table 4) indicated that problematic media use [(F(4, 413) = 10.34, $p < .001$)], working memory [(F(4, 413) = 4.57, $p = .001$)], and inhibitory control [(F(4, 413) = 5.27, $p < .001$)] changed significantly according to TV watching time. According to the results of the Scheffe test, which was conducted to determine between which group's differences in TV watching time were observed, those who did not watch TV ($\bar{x} = 51.78$) and those who watched TV for 0 – 30 minutes ($\bar{x} = 53.85$), 31 – 60 minutes ($\bar{x} = 58.28$), and

1 – 2 hours ($\bar{x} = 59.01$) exhibited less problematic media use than those who spent 3 hours or more ($\bar{x} = 77.64$). When TV watching time and working memory were compared, it was observed that those who did not watch TV ($\bar{x} = 50.72$) and those who watched TV for 0 – 30 minutes ($\bar{x} = 49.75$) had higher working memory scores than those who watched TV for 3 hours or more ($\bar{x} = 43.25$). When inhibitory control was compared in terms of TV watching time, it was determined that those who did not watch TV ($\bar{x} = 41.50$) and those who watched TV for 0 – 30 minutes ($\bar{x} = 40.32$) had higher inhibitory control scores than those who watched TV for 3 hours or more ($\bar{x} = 34.61$).

As a result of the multiple linear regression analysis (Table 4), it was observed that TV watching time significantly predicted working memory ($R^2 = 0.029, p < .001$). Preschool children's TV watching time accounted for around 3% of the total variance in working memory. When examining TV watching time, it was observed that watching no television had a positive effect on working memory, whereas watching 3 hours or more had a negative effect. In addition, TV watching time significantly predicted inhibitory control ($R^2 = 0.039, p < .001$). The preschoolers' TV watching time accounted for around 4% of the total variance in inhibitory control. When examining TV watching time, it was observed that not watching television had a positive impact on inhibitory control; however, watching television for 1–2 hours and 3 hours or more had a negative effect on inhibitory control.

The simple linear regression analysis indicates that problematic media use significantly predicted working memory ($R^2 = 0.293, p < .001$) (Table 5). Problematic media use accounted for 29% of the total variance in working memory. A standard deviation decrease in problematic media use affected a decrease of -0.541 units in working memory. In addition, problematic media use significantly predicted inhibitory control ($R^2 = 0.273, p < .001$). Problematic media use accounted for 27% of the total variance in inhibitory control. Accordingly, a standard deviation decrease in problematic media use affected a decrease of -0.523 units in working memory.

Discussion

This study investigated the role of problematic media use and TV watching time on working memory and inhibitory control components of EFs among preschool children. There are various causes for problematic media use and the choice of television as a media tool in the main problem of this study, as well as EFs: (1) EFs predict basic developmental outcomes, (2) EFs are affected by some television content (Lillard et al., 2015), and (3) children spend a long time with television and the media tool they are most exposed to is television (Tozduman Yarah, 2021). Findings of the present study indicate that problematic media use and TV watching time had a decisive role in preschool children's EFs. The study revealed a significant negative correlation between CHEXI's working memory and inhibitory control subscales and PMUM (Table 2). The findings are compatible with previous study findings that screen exposure is associated with executive functioning (Nathanson et al., 2014). It has been stated that television exposure, especially during infancy, affects EFs (Miyake & Friedman, 2012), which are the developmental processes behind goal-oriented self-regulation behaviors such as attention, planning, and inhibitory control, and may cause problems in cognitive

Table 2.
Pearson's Correlation Analysis Results for the Correlation Between the Scales

Scale and Its Subscales		1	2	3
1. Working memory subscale	<i>r</i>	1.000	0.882	-0.541
	<i>p</i>	–	.000*	.000*
2. Inhibitory control subscale	<i>r</i>		1.000	-0.523
	<i>p</i>		–	.000*
3. Problematic media use measure	<i>r</i>			1.000
	<i>p</i>			–

* $p < .05$.

Table 3.*Analysis of Variance Results of Problematic Media Use, Working Memory, and Inhibitory Control Based on TV Watching Time*

	Time	n	$\bar{x}$	SD	DF	F	p	Significant Difference
Problematic media use	Never	50	51.78	20.28	4/413	10.336	.000	Never – 3 hours
	0 – 30 minutes	116	53.85	22.36				0 – 30 minutes – 3 hours
	31 – 60 minutes	122	58.28	21.57				31 – 60 minutes – 3 hours
	1 – 2 hours	86	59.01	20.53				1 – 2 hours – 3 hours
	3 hours and more	44	77.64	30.13				
Working memory	Never	50	50.72	10.27	4/413	4.573	.001	Never – 3 hours
	0 – 30 minutes	116	49.75	10.44				0-30 minutes – 3 hours
	31 – 60 minutes	122	48.56	9.09				
	1 – 2 hours	86	47.33	8.96				
	3 hours and more	44	43.25	10.73				
Inhibitory control	Never	50	41.50	8.91	4/413	5.271	.000	Never – 3 hours
	0 – 30 minutes	116	40.32	8.95				0 – 30 minutes – 3 hours
	31 – 60 minutes	122	38.84	7.83				
	1 – 2 hours	86	38.08	7.40				
	3 hours and more	44	34.61	8.30				

and social functions in later periods. When performing EFs and watching television, people employ the same information processing resources. Therefore, when information processing resources are used during TV watching, it becomes difficult to use them during executive activities. When children are overstimulated by the content broadcast on television or encounter new and challenging content, their information processing process impairs (Lillard et al., 2015). In a study, it was determined that even watching a fast-paced television show (cartoon) for just 9 minutes can have

negative effects on the EF of a 4-year-old (Lillard & Peterson, 2011). These findings in the literature and in the present study are regarded as quite beneficial in terms of development.

Another interesting finding of the study was that working memory and inhibitory control differed significantly depending on television-watching time. It was determined that individuals who did not watch television throughout the day, those who watched TV for 0 – 30 minutes, 31 – 60 minutes, and 1 – 2 hours had less

Table 4.*Results of Multiple Linear Regression Analysis on the Effect of TV Watching Time on Executive Functions*

Dependent Variable(s)	Independent Variable	Unstandardized Values		Standardized Values		
		B	Std _b	β	t-test	p
Working memory	Constant	50.720	1.382	–	96.577	.000*
	0 – 30 minutes	–.970	1.654	–0.044	–0.587	.558
	31 – 60 minutes	–2.163	1.641	–0.099	–1.317	.188
	1 – 2 hours	–3.394	1.738	–0.138	–1.953	.052
	3 hours and more	–7.470	2.021	–0.231	–3.697	.000*
	R = 0.206 F _(4,413) = 4.573	R ² = 0.029 p = .000*				
Inhibitory control	Constant	41.500	1.167	–	35.559	.000*
	0 – 30 minutes	–1.181	1.396	–.063	–.846	.398
	31 – 60 minutes	–2.656	1.386	–.144	–1.916	.056
	1 – 2 hours	–3.419	1.468	–.164	–2.329	.020*
	3 hours and more	–6.886	1.709	–.251	–4.037	.000*
	R = 0.220 F _(4,413) = 5.271	R ² = 0.039 p = .000*				

Table 5.*Results of Simple Linear Regression Analysis on the Effect of Problematic Media Use on Executive Functions*

Dependent Variable(s)	Independent Variable	Unstandardized Values		Standardized Values		
		B	Std. _b	β	t-test	p
Working memory	Constant	61.729	1.100	–	56.105	.000*
	Problematic media use	–0.229	.017	–0.541	–13.116	.000*
	R = 0.541 F _(1,416) = 172.020	R ² = 0.293 p = .000*				
Inhibitory control	Constant	49.930	.945	–	52.864	.000*
	Problematic media use	–0.187	.015	–0.523	–12.504	.000*
	R = 0.523 F _(1,416) = 156.339	R ² = 0.273 p = .000*				

problematic media use than those who watched TV for 3 hours or more. When TV watching duration was correlated with working memory and inhibitory control, people who did not watch television or watched for 0 – 30 minutes had better working memory and inhibitory-control scores than those who watched TV for 3 hours or more (Table 3). This finding suggests that increased TV watching time throughout the preschool years may be a risk factor for developmental problems. Studies have reported that excessive use of digital media tools in the preschool period has also been associated with delays in cognitive, linguistic, social, emotional, and motor development areas in children (Pagani et al., 2010), which supports this idea. In their study, McNeil et al. (2019) investigated the correlation of media use in preschool period with EFs and psychosocial development and reported that higher levels of media exposure at the ages of 3 – 5 years resulted in an increase in externalization and behavioral problems and negative psychological development. In addition to this finding, it was reported that a low level of media exposure did not cause significant changes in EFs, and high media exposure (≥ 30 minutes/day) was detrimental to EFs. Furthermore, the results of several studies conducted after the 2000s have shown that watching television is associated with decreased attention abilities both concurrently and/or in the long term (Swing et al., 2010). In their study, Nathanson et al (2014) reported that children who cumulatively watched more television had lower EF. Contrary to popular belief, the effect of television on children's EF is not limited to just watching. In their study, Schmidt et al. (2008) determined that children's focused attention span was three-quarters of the time the television was turned on, which indicates that television was more than just background noise.

Another important result of the study was that TV watching time predicted working memory and inhibitory control. Television is the most studied media tool and the most discussed effect on children in the literature (Tozduman Yaralı, 2021). While television causes children to be constantly exposed to stimuli that are not normally of interest to them, it also prevents them from making related thoughts. This is thought to be an indication that television watched in the early period is associated with attention problems in 7-year-old children. Given these impacts of television, the American Academy of Paediatrics recommends that children under the age of 24 months should not be exposed to technological products that provide one-way communication, but it emphasizes that this duration should be 2 hours on average for

preschool children (AAP, 2011). While there are several remarks for restricting screen usage of children throughout the preschool period, the most crucial factor here is parents. In their study, Yang et al. (2017) determined that TV watching time and educational programs for children were associated with EF. Furthermore, television content fully mediated the effect of TV watching time on EF, and parent-restrictive approach strategies moderated the effect of TV watching time on EF (Yang et al., 2017).

Another study finding was that problematic media use significantly predicted working memory and inhibitory control, and thus accounted for 29% of the total variance in working memory and 27% of the total variance in inhibitory control. Problematic media use refers to children's exposure to media at a level that may adversely affect their development (Domoff et al., 2020). In this context, the increase in screen exposure of children due to electronic games as well as watching TV or video includes problematic media use (Domoff et al., 2019). In this regard, Yang et al. (2020) examined the correlation between electronic games and executive functions in their study conducted with Chinese children aged 3 – 6 and revealed that time spent on electronic games was associated with EF when factors such as children's age, gender, and socioeconomic status were controlled.

Finally, as a result of the study, it can be asserted that problematic media use is correlated with executive functions in preschool children. For this purpose, some researchers have stated that television may cause attention disorders, as well as children with attention disorders may prefer to watch television selectively in the early periods. Acevedo-Polakovich (2007) stated that children with ADHD watched television more than other children, and they enjoyed television more. Likewise, it was found that children with Autism Spectrum Disorder watched television earlier and more often than children with typical development (Chonchaiya et al., 2011). These results show that in addition to the effect of screen exposure on executive functions, children with problems in executive functions may be more interested in the screen.

Limitations and Directions/Suggestions for Future Research

Parents are ultimately responsible for how much time their children spend watching television and what they learn from it. When parents regulate the use of media tools, watch the programs with their children, and interpret together what the children see, they can both benefit from the positive aspects of television for the child and protect the child from violent programs. Limiting the

amount of time children spend in front of screens and allocating time for other activities such as exercise, face-to-face interaction, and time spent outside can be beneficial for their development. It is deemed important to guide families in managing the time their children spend in front of a screen. Although this study reveals important results for current studies in terms of the critical role of problematic media use on working memory and inhibitory control, the study has certain limitations. The study had a cross-sectional design. In the study, correlational results were obtained, but causality was restricted. Furthermore, all information was received via the mothers, and self-reports were not received from the children. The data obtained only from mothers caused concerns that they could be prejudiced against their children. Despite these limitations, the study is thought to shed light on the correlation between problematic media use and executive functions in children and to serve as a reference for future research on the issue.

Data Sharing and Declaration: The datasets generated and/or analyzed in the study are not publicly released but are available from the corresponding author upon reasonable request.

Ethics Committee Approval: Ethical committee approval was received from the Ethics Committee of Aydın Adnan Menderes University, Faculty of Health Sciences. (Approval No: 2022/36 Date: 26.10.2022).

Informed Consent: Written informed consent was obtained from the parents of the participants who agreed to take part in the study.

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ORIGINAL ARTICLE

Experiential Avoidance in the Relationship between Depression, Anxiety, Stress, and Smartphone Addiction*

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Main Points

- The current study explores the relationships among depression, anxiety, stress, experiential avoidance, and smartphone addiction.
- The results revealed that experiential avoidance acts as a mediator in the link between depression, anxiety, stress, and smartphone addiction.
- Higher levels of depression, anxiety, and stress are linked to a greater level of smartphone addiction, both directly and indirectly, through experiential avoidance.
- Based on the study results, it can be argued that depression, anxiety, stress, and experiential avoidance are risk factors for smartphone addiction.
- These findings shed light on the impact of depression, anxiety, stress, and experiential avoidance on the comprehension and prevention of smartphone addiction.

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Abstract

While the strong correlation between negative emotional experiences such as depression, anxiety, stress, and smartphone addiction, is well-established, understanding the mechanisms that mediate this relationship remains limited. The aim of this study is to investigate the mediating role of experiential avoidance in the relationships between depression, anxiety, stress, and smartphone addiction in university students. A sample of 546 university students from various regions of Türkiye participated in this study (426 females [78.3%] and 120 males [21.7%]). The Depression Anxiety Stress Scale, Multidimensional Experiential Avoidance Questionnaire, and Smartphone Addiction Scale Short Version were employed for data collection. Structural equation modeling was employed for data analysis. After controlling for age and gender, the results revealed (i) significant positive associations between depression, anxiety, stress, experiential avoidance, and smartphone addiction; and (ii) experiential avoidance mediated the effects of depression, anxiety, and stress on smartphone addiction. These findings shed light on the effects of depression, anxiety, stress, and experiential avoidance on the comprehension and prevention of smartphone addiction.

Keywords: Anxiety, depression, experiential avoidance, smartphone addiction, stress

Introduction

The ubiquity of smartphones, coupled with their multifunctionality, has rendered them indispensable in daily routines. By 2023, global smartphone users numbered 5.3 billion, with projections indicating an increase to 6.2 billion within the next 5 years (Statista, 2023). Despite the convenience

they afford, excessive and unintended smartphone usage can give rise to issues such as SA (Sohn et al., 2019), internet addiction, and cybersex addiction (Meng et al., 2022), among others. Alongside many problems caused by smartphones, SA is reported to be quite prevalent among university students in particular (Chen et al., 2017; Sohn et al., 2019).



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Termed problematic smartphone use or excessive smartphone usage in academic discourse, SA manifests as uncontrolled and disproportionate reliance on smartphones (Sohn et al., 2019). It encompasses compulsive phone usage, tolerance (an increased need for prolonged and intensified usage), withdrawal symptoms (feelings of agitation or distress upon separation from the device), and impaired functionality (Chen et al., 2017). Although there is no consensus in the literature, SA is commonly viewed as a behavioral addiction similar to other technology addictions (Meng et al., 2022). However, recent meta-analytic findings suggest that SA is markedly more widespread (at 26.9%) than other forms of technology addiction (Meng et al., 2022). This underscores the distinct significance of SA within the landscape of technological dependencies.

Research indicates that SA is linked to various physical and mental health issues among university students (Bong & Kim, 2017; Matar & Jaalouk, 2017). A meta-analysis has revealed that SA correlates with heightened levels of depression, anxiety, perceived stress, and diminished sleep quality (Sohn et al., 2019). A systematic review conducted by Elhai et al. (2017) found that problematic smartphone use was related to depression, anxiety, chronic stress, and low self-esteem. Consequently, exploring factors contributing to the escalation of SA holds clinical and scholarly significance, given its potential adverse impacts on individuals.

Negative internal states such as depression, anxiety, and stress stand out as key antecedents of SA. The extensive literature review highlights numerous research findings demonstrating the link between these variables (Elhai et al., 2017; Sohn et al., 2019). Among the theoretical frameworks explaining this relationship, the theory of Compensatory Internet Use (CIU) stands out. According to this theory, the internet and related technologies, including online gaming, function as coping mechanisms for individuals to assuage negative emotions and fulfill social needs. In other words, individuals may turn to online activities as a means to escape real-life challenges or alleviate dysphoric moods (Kardefelt-Winther, 2014a, 2014b).

Smartphones hold a unique significance compared to other technological devices owing to their widespread usage, accessibility to diverse online activities such as internet browsing, gaming, and communication, as well as their capacity to ensure privacy. Within this framework, smartphones have a compensatory effect in addressing internal challenges. Moreover, depression, anxiety, and stress are pivotal in precipitating SA. Previous research findings confirm the predictive effect of depression, anxiety, and stress on SA (Bong & Kim, 2017; Gao et al., 2018). For example, Gao et al. (2018) conducted a study with 1105 university students and found that depression, anxiety, and stress had a positive predictive effect on mobile phone addiction. Similarly, another study identified depression and anxiety as significant predictors of SA among university students (Matar & Jaalouk, 2017). In light of these findings, depression, anxiety, and stress emerge as critical risk factors in the development of SA among university students, potentially exerting a positive predictive influence on its onset.

Acceptance and Commitment Therapy (ACT) leverages experiential avoidance (EA) mechanisms to elucidate various problematic behavioral patterns. Within this framework, EA stands out as a fundamental mechanism driving individuals to shun

distress and constrict their psychological adaptability (Hayes et al., 1999). Hayes et al. (1996) define EA as the inclination of individuals to evade discomfort-inducing experiences such as bodily sensations, emotions, memories, and thoughts. Unlike conventional avoidance behaviors, EA pertains specifically to internal experiences. Though often construed as detrimental, EA may initially serve as a coping mechanism for managing specific negative internal states, providing short-term relief (Hayes et al., 1996). However, prolonged reliance on this tendency across diverse contexts can erode individuals' autonomy and restrict their life choices over time (Hayes et al., 2012). Hayes et al. (1999) posit that EA manifests in various forms, including engaging in risky sexual behaviors and excessive alcohol and substance use, and plays an important role in the development of numerous psychopathologies, notably addiction. Extensive literature reviews indicate that EA correlates with various forms of addiction, such as tobacco dependence, problematic alcohol consumption, and substance addiction (Garey et al., 2016; Levin et al., 2012; Shorey et al., 2017). Research among adolescents suggests a link between EA and addictive behaviors involving internet usage, mobile phones, and video games (García-Oliva & Piqueras, 2016). Moreover, multiple studies underscore the association between EA and SA (Bong & Kim, 2017; Ko & Kwak, 2018). Given the widespread availability of smartphones, their privacy features, and multifunctionality, they can serve as a refuge from distressing internal stimuli, potentially fostering addiction over time. Indeed, research confirms the predictive influence of EA on SA (Bong & Kim, 2017; García-Oliva & Piqueras, 2016; Ko & Kwak, 2018). Furthermore, there is compelling evidence suggesting that depression, anxiety, and stress exacerbate EA (Bong & Kim, 2017; Litwin et al., 2017; Shahar & Herr, 2011). These negative internal states often engender intense internal experiences, prompting individuals to seek avoidance strategies. Consequently, heightened levels of depression, anxiety, and stress may correspond to increased tendencies towards experiential avoidance.

Experiential avoidance comprises two fundamental components: first, the individual's reluctance to engage with distressing subjective experiences (such as bodily sensations, emotions, and thoughts), and second, the adoption of strategies to evade or regulate these experiences (Hayes et al., 1996). In this context, EA serves as an explanatory framework for understanding the link between distressing subjective experiences (such as depression, anxiety, and stress) and problematic behaviors (such as SA). Research suggests that individuals inclined to avoid distressing subjective experiences tend to exhibit heightened levels of problematic behaviors. For example, a study involving female university students revealed that EA had a significant mediating role on the relationship between negative emotions and emotional eating (Litwin et al., 2017). In another study, EA was found to mediate the relationship between perceived stress and tobacco dependence (Garey et al., 2016). Bong and Kim (2017) found that EA has a partial mediating effect on the relationship between life stress and SA among nursing college students. In another study, EA had a mediating effect on the relationship between anxious attachment and SA among university students (Ko & Kwak, 2018). In another study, it was determined that EA partially mediated the relationship between perceived stress and problematic smartphone use among university students (Zhang & Wang,

2022). Consequently, smartphones may serve as a means to circumvent distressing subjective experiences.

The Present Study

In line with prior literature and pertinent theories (ACT, and CIU), this study investigates whether EA functions as a mediator in the association between depression, anxiety, stress, and SA among university students. To address this objective, the following hypotheses were examined (visualized in Figure 1):

H₁: Depression, anxiety, and stress would be directly associated with greater SA.

H₂: Depression, anxiety, and stress would be directly associated with greater EA.

H₃: Experiential avoidance would be directly associated with greater SA.

H₄: Depression, anxiety, and stress would be indirectly associated with greater SA via greater EA.

Material and Methods

Participants

The study's sample group comprised 546 university students (120 [21.7%] males and 426 [78.3%] females) enrolled in several universities in Türkiye. The convenience sampling, a non-random sampling method, was used in the selection of participants. This method aims to reduce the expenditure of time, money, and labor by considering the accessibility of the research group (Büyüköztürk et al., 2016). The sample size was estimated to be 384 participants using Krejcie and Morgan's (1970) table. Moreover, a minimum sample size of 200 participants is recommended for structural equation modeling (SEM) analyses (Kline, 2005). The present study meets the criteria for the required sample size. The ages of the participants ranged between 18 and 32, and their average age was 22.65 (standard deviation [SD] = 3.23). Among the total students, 22 (4.0%) were preparatory, 88 (16.6%) were in their first year, 60 (11.0%) were in their second year, 40 (7.3%) were in their third year, 51 (9.3%) were in their fourth year, nine (1.6%) were in their fifth year, and four (.7%) were in their sixth year.

Measurements

Depression Anxiety Stress Scale

The original form of the scale, developed by Lovibond and Lovibond (1995) consisted of 42 items. Yılmaz et al. (2017) adapted it to Turkish and shortened it. The scale consists of

21 items, including three dimensions: depression, anxiety, and stress. The Depression Anxiety Stress Scale-21 uses a 4-point Likert scale ranging from "never" to "almost always." Researchers have stated that people with high scores on the scale indicate a higher level of the respective dimension. The Cronbach's alphas were .68 for "depression," .66 for "anxiety," and .61 for the "stress." The Cronbach's alphas were .89 for "depression," .86 for "anxiety," and .88 for "stress" in this study.

Multidimensional Experiential Avoidance Questionnaire

The scale developed by Sahdra et al. (2016) was adapted into Turkish by Ekşi et al. (2018). The scale consisted of 30 items, including six dimensions: behavioral avoidance, distress aversion, distraction and suppression, procrastination, repression/denial, and distress endurance. The MEAQ uses a 7-point Likert scale ranging from "strongly disagree" to "strongly agree," with high scores on the scale indicating higher level of experiential avoidance. The Cronbach's alpha of the subscales ranged between .78 and .81. The Cronbach's alpha of the subscales ranged between .64 and .90 in this study.

The Smartphone Addiction Scale

Participants' SA has been assessed with the 10-item scale developed by Kwon et al (2013). The scale uses a 6-point Likert scale ranging from "strongly disagree" to "strongly agree" with high scores on the scale indicating higher level of SA. The short version of the SAS was adapted into Turkish by Noyan et al. (2015), with a reliability coefficient of 0.91. The current study's Cronbach's alpha was 0.90.

Procedure

Prior to commencing data collection, ethical approval was obtained from Social and Humanities Ethics Committee of Dicle University (Approval no.: E-14679147-663.05-475938; Date: April 05, 2023). The study utilized scales transferred to an online platform via Google Forms, with corresponding invitation links generated. These links were disseminated across social media platforms between March and April 2023. Eligible participants were university students aged between 18 and 32. Clear information regarding the study's purpose, voluntary participation, confidentiality measures, and participants' right to withdraw was provided through an informed consent form. To mitigate potential issues such as practice effects, fatigue, or response bias stemming from the utilization of multiple measurement tools, the scales were administered in varied sequences during data collection sessions.

Data Analysis

The study employed the SPSS 22 (IBM SPSS Corp.; Armonk, NY, USA) and AMOS 19 software packages. Descriptive statistics and correlation analyses were conducted using SPSS 22, while SEM analyses were carried out with AMOS 19. Given the online data collection method, no missing data were encountered. Before initiating data analysis, assessments for both univariate and multivariate normality were conducted. Univariate normality was deemed acceptable if skewness and kurtosis values fell within the range of -1.5 to +1.5. As indicated in Table 1, all variables met the criteria for univariate normality. Furthermore, multivariate normality necessitated a multiple kurtosis value below 10 (Collier, 2020). To ensure adherence to multivariate normality assumptions, 31 outliers were identified and removed from

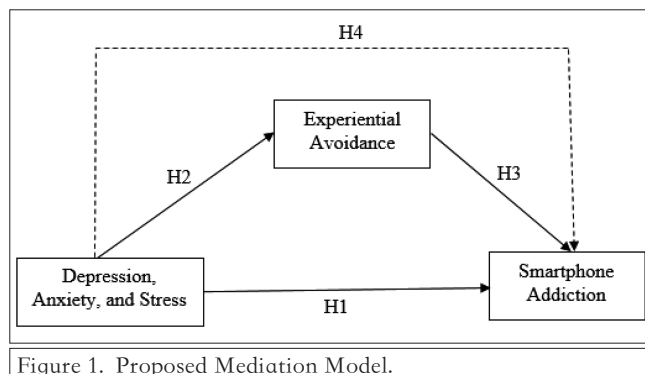


Table 1.
Preliminary Analysis

	1	2	3	4	5
1. Depression	1				
2. Anxiety	.63**	1			
3. Stress	.72**	.64**	1		
4. Experiential avoidance	.43**	.35**	.44**	1	
5. Smartphone addiction	.44**	.43**	.50**	.44**	1
Mean	7.94	6.65	8.80	116.19	27.67
Standard deviation	5.99	5.31	5.48	24.21	11.70
Skewness	.56	.64	.25	-.07	.56
Kurtosis	-.30	-.43	-.68	-.20	-.31

** $p < .01$.

the dataset using the Mahalanobis distance method, ultimately achieving multivariate normality (multiple kurtosis = 9.73).

In the SEM analyses, the Maximum Likelihood estimation method was employed, utilizing a two-step approach recommended by Kline (2005). This approach aids in identifying potential errors originating from the measurement model. To form latent variables, observed variables were generated using the parceling method proposed by Little et al. (2002). Items from the SAS and the DASS-21 were randomly distributed to create parcels. Similarly, the six sub-dimensions of the MEAQ were parceled to construct latent variables. Since past studies indicated that age and gender could affect SA, both variables were included as control variables in the structural model (Chen et al., 2017; Van Deursen et al., 2015).

The goodness of fit of the tested model was assessed using various indices, including χ^2/df , RMSEA (Root Mean Square Error of Approximation), CFI (Comparative Fit Index), NFI (Normed Fit Index), GFI (Goodness of Fit Index), and SRMR (Standardized Root Mean Square Residual). Acceptable goodness of fit was indicated by χ^2/df values less than five, CFI, NFI, and GFI values greater than .90, and SRMR and RMSEA values less than .08 (Hu & Bentler, 1999; Kline, 2005). In the mediation analysis, Hayes' (2013) Bootstrap method was employed. This method involves increasing the sample size to analyze both direct and indirect effects. To establish the significance of the indirect effect, CIs should not encompass zero. In this study, a bootstrap coefficient of 5000 was set, and findings were evaluated based on a 95% CI.

Results

Preliminary Analysis

The preliminary analyses of the research variables are summarized in Table 1. Examination of skewness and kurtosis values indicates that the research data are normally distributed. Additionally, the correlations between variables were investigated. It is seen that depression is positively and meaningfully correlated to EA ($r = .43$, $p < .05$) and SA ($r = .44$, $p < .05$). Anxiety is positively and meaningfully correlated to EA ($r = .35$,

$p < .05$) and SA ($r = .43$, $p < .05$). Stress is positively and meaningfully correlated to EA ($r = .44$, $p < .05$) and SA ($r = .50$, $p < .05$). Finally, EA is positively and meaningfully correlated to SA ($r = .44$, $p < .05$).

Measurement Model

The measurement model comprised five latent variables (depression, anxiety, stress, experiential avoidance, and SA) and 15 observed variables. For depression, anxiety, and stress, two parcels were created, while three parcels were formed for SA. Experiential avoidance was constructed using the sub-dimensions of the relevant scale. Initially, the goodness of fit values for the tested model did not fall within an acceptable range ($\chi^2/df = 4.68$, GFI = .89, CFI = .94, NFI = .92, RMSEA = .09, SRMR = .08). Consequently, the distress tolerance sub-dimension of the MEAQ, which exhibited factor loadings below .40, was removed from the model. Upon repeating the analysis, it was observed that the goodness of fit values for the tested model now fell within an acceptable range ($\chi^2/df = 4.12$, GFI = .93, CFI = .96, NFI = .95, RMSEA = .07, SRMR = .06). Additionally, all factor loadings of the observed variables were found to be significant ($p < .05$).

Mediation Analysis

Three mediation models were developed in accordance with the research hypotheses. These models included depression, anxiety, and stress as independent variables, EA as the mediator variable, and SA as the dependent variable. Mediation analyses were performed using the bootstrapping method, with gender and age included as control variables.

The tested model pertaining to the mediating role of EA in the relationship between depression and SA is depicted in Figure 2. Inspection of Figure 2 reveals that all factor loadings of the observed variables are statistically significant for each latent variable ($p < .05$). The tested mediation model demonstrates an acceptable model fit ($\chi^2/df = 4.29$, GFI = .94, CFI = .95, NFI = .93, RMSEA = .07, SRMR = .07). As shown in Figure 2, the path between depression and EA is significant ($\beta = .57$, $p < .001$), as is the direct path between depression and SA ($\beta = .20$, $p < .001$). Additionally, the path between EA and SA is significant ($\beta = .46$, $p < .001$). Finally, it was determined that the indirect path between depression and SA is significant ($\beta = .27$, $p < .001$, CI = .181/.369). This finding suggests that EA mediated the association between depression and SA.

The tested model pertaining to the mediating role of EA in the relationship between anxiety and SA is depicted in Figure 3. Inspection of Figure 3 reveals that all factor loadings of the observed variables are statistically significant for each latent variable ($p < .05$). The tested mediation model demonstrates an acceptable model fit ($\chi^2/df = 4.22$, GFI = .94, CFI = .94, NFI = .93, RMSEA = .07, SRMR = .07). As shown in Figure 3, the path between anxiety and EA is significant ($\beta = .48$, $p < .001$), as is the direct path between anxiety and SA ($\beta = .26$, $p < .001$). Additionally, the path between EA and SA is significant ($\beta = .44$, $p < .001$). Finally, it was determined that the indirect path between anxiety and SA is significant ($\beta = .21$, $p < .001$, CI = .136/.300). This finding suggests that EA mediated the association between anxiety and SA.

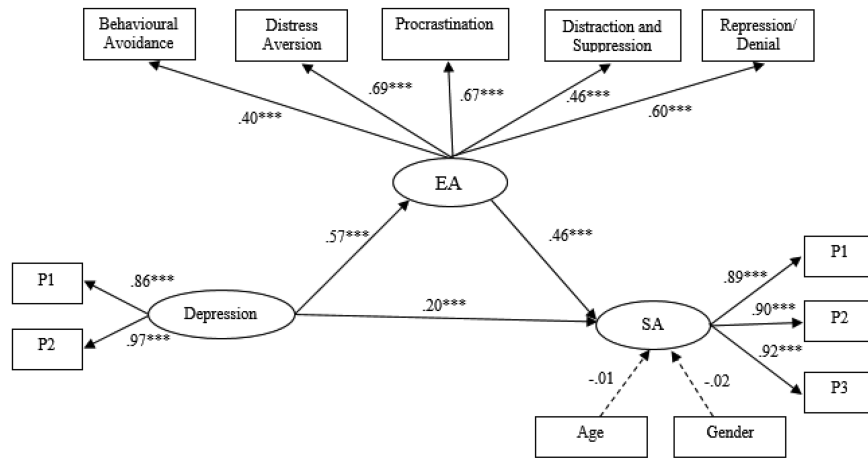


Figure 2. Testing the Mediator Role of EA in the Relationship between Depression and SA. Standardized values were used to report effects. The model fit: $\chi^2/df = 4.29$, GFI = .94, CFI = .95, NFI = .93, RMSEA = .07, SRMR = .07.

The tested model pertaining to the mediating role of EA in the relationship between stress and SA is depicted in Figure 4. Inspection of Figure 4 reveals that all factor loadings of the observed variables are statistically significant for each latent variable ($p < .05$). The tested mediation model demonstrates an acceptable model fit ($\chi^2/df = 3.97$, GFI = .94, CFI = .95, NFI = .94, RMSEA = .07, SRMR = .07). As shown in Figure 4, the path between stress and EA is significant ($\beta = .60$, $p < .001$), as is the direct path between stress and SA ($\beta = .32$, $p < .001$). Additionally, the path between EA and SA is significant ($\beta = .37$, $p < .001$). Finally, it was determined that the indirect path between stress and SA is significant ($\beta = .22$, $p < .001$, CI = .136/.326). This finding suggests that EA mediated the association between stress and SA.

Discussion

In this study, the initial step involved examining the relationships between the relevant variables, followed by testing the mediating effect of EA in the relationship between depression, anxiety, stress, and SA. Drawing from the relevant theoretical background and existing research, EA was hypothesized to act as a mediator

between maladaptive behaviors adopted to mitigate the impact of aversive internal experiences (Bong & Kim 2017; Garey et al., 2016; Litwin et al., 2017). Notably, this study represents the first attempt to investigate the mediating role of EA in the relationship between depression, anxiety, stress, and SA among Turkish university students. The findings from this study lend support to the four tested hypotheses. Specifically, the results indicate that individuals with elevated levels of depression, anxiety, and stress have higher levels of SA (H_1). This aligns with prior research suggesting that heightened levels of depression, anxiety, and stress may indeed act as risk factors for the onset and exacerbation of SA (Bong & Kim, 2017; Gao et al., 2018; Matar & Jaalouk, 2017). According to the CIU theory, the internet, including online activities like gaming, serves as a significant coping mechanism for individuals to manage negative emotions and fulfill social needs (Karddefelt-Winther, 2014a, 2014b). Given the widespread usage of smartphones, which provide access to various online activities such as browsing, gaming, and social media, individuals experiencing high levels of depression, anxiety, and stress may turn to their smartphones to alleviate the impact of these negative emotions. The findings obtained in this study align with the

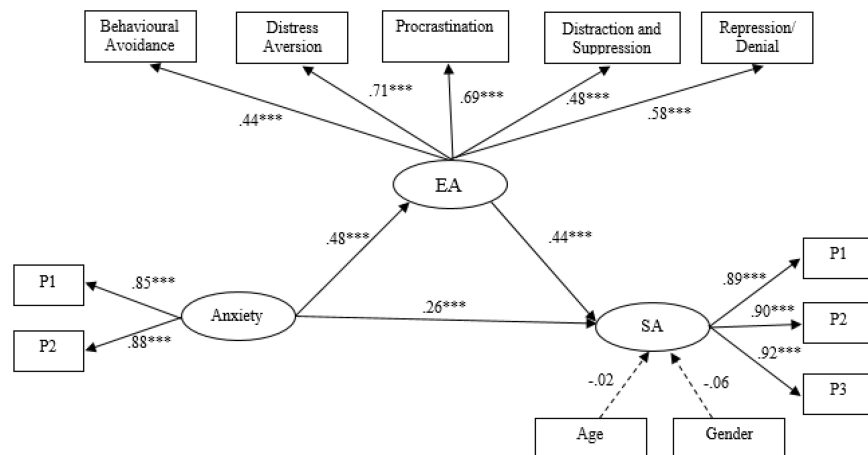
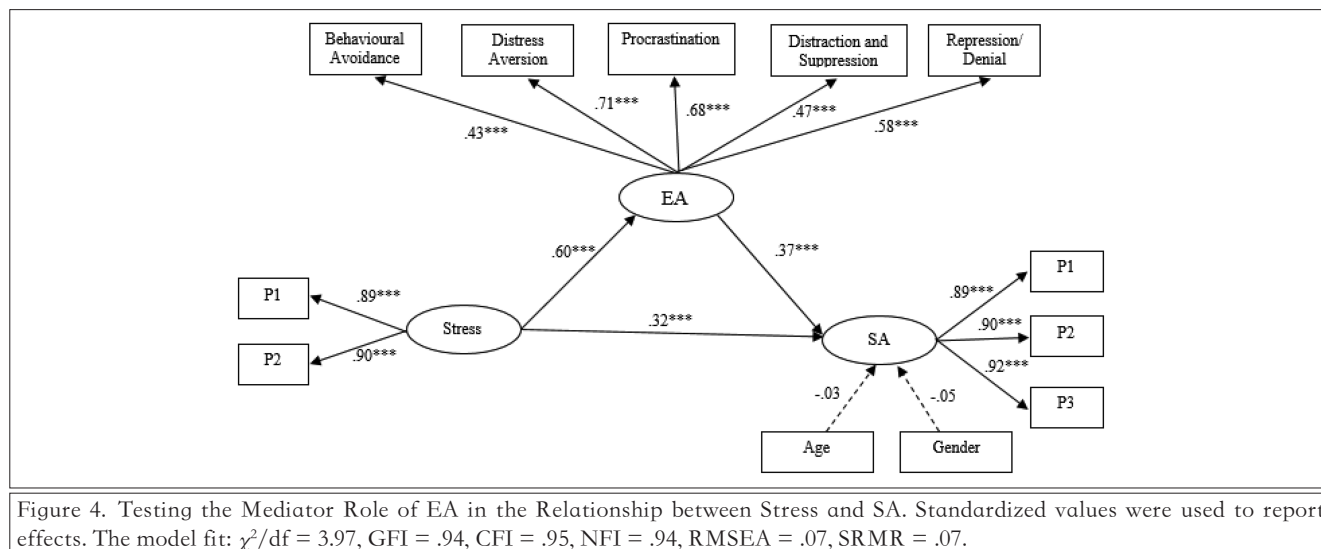


Figure 3. Testing the Mediator Role of EA in the Relationship between Anxiety and SA. Standardized values were used to report effects. The model fit: $\chi^2/df = 4.22$, GFI = .94, CFI = .94, NFI = .93, RMSEA = .07, SRMR = .07.



tenets of the CIU theory, supporting the notion that individuals may resort to smartphone use as a means of coping with adverse emotional states.

Another significant finding from the analysis results is that university students with elevated levels of depression, anxiety, and stress tend to demonstrate increased levels of EA (H_2). This finding corroborates previous research demonstrating the predictive influence of depression, anxiety, and stress on EA (Bong & Kim, 2017; Litwin et al., 2017; Shahar & Herr, 2011). These negative internal states often engender intense internal experiences. Therefore, it is likely that individuals tend to avoid these aversive experiences. Consequently, heightened levels of depression, anxiety, and stress may correspond to increased tendencies towards experiential avoidance. Additionally, the research results indicate that university students with elevated levels of EA tend to exhibit higher levels of SA (H_3). This finding aligns with prior research highlighting the relationship between EA and SA, as well as with the principles of the ACT theory (Bong & Kim, 2017; García-Olivia & Piqueras, 2016; Ko & Kwak, 2018). Thus, smartphones may serve as a means for individuals to alleviate the adverse effects of aversive internal experiences they encounter.

Finally, the results of the mediation analysis reveal that EA mediates the association between depression, anxiety, stress, and SA (H_4). This finding aligns with prior research demonstrating the mediating role of EA in linking aversive internal experiences to addictive behaviors (Bong & Kim, 2017; Garey et al., 2016; Litwin et al., 2017). For instance, Zhang and Wang (2022) found that EA partially mediated the association between perceived stress and SA among university students. Similarly, in another study, it was found that EA mediated the relationship between anxious attachment and SA among university students (Ko & Kwak, 2018). Hence, experiential avoidance, a pivotal concept in ACT theory, emerges as a mediator in the association between depression, anxiety, stress, and SA. In essence, individuals with heightened levels of depression, anxiety, or stress are inclined to exhibit elevated levels of experiential avoidance, subsequently leading to increased SA. According to ACT, EA refers to an individual's inclination to evade contact with aversive internal experiences and to adopt strategies aimed at controlling or mitigating the

impact of these experiences (Hayes et al., 1996). In this context, EA is perceived as a crucial intermediary in the relationship between depression, anxiety, stress, and SA, serving as a bridge that enhances the comprehension of this intricate relationship.

Limitations

This study possesses several limitations that warrant acknowledgment. Firstly, being a cross-sectional study examining relationships between variables, it precludes the ability to establish causal relationships based solely on the research findings. It is recommended that longitudinal studies be conducted in future research to track changes over time and better understand the causal relationships between variables. Secondly, data were acquired through self-reported online survey forms, potentially leading to a bias towards participants providing socially desirable responses (Krumpal, 2013). To address this limitation, future studies could incorporate diverse data sources such as input from family members, teachers, peers, and other relevant sources. In addition, despite the accuracy of the measurement tools used, the participants' subjective experiences of smartphone addiction and experiential avoidance were not assessed. The use of mixed or qualitative research methods in future studies may provide more comprehensive insights. Thirdly, the study sample consists of university students, the majority of whom are women. This situation limits the generalizability of the findings to different gender, age, and cultural groups. In future studies, working with samples that have a more balanced gender distribution, including participants from different age groups, cultural backgrounds, and educational levels, will contribute to obtaining more comprehensive and applicable results. Fourth, although validated measurement tools were used in the study, relatively low Cronbach's alpha values were reported for some subscales. This situation may have introduced bias in terms of measurement consistency across different samples. In future studies, it is recommended that the data collection tools be re-evaluated to ensure their validity and reliability. Lastly, SA was considered as a singular dimension in the current study. Future investigations could benefit from examining various types of addiction, including internet addiction, social media addiction, online sex addiction, online gaming addiction, and others. This approach would yield more comprehensive insights into addictive behaviors and their relationships with depression,

anxiety, stress, and experiential avoidance. In addition, this study focused on the mediating effect of experiential avoidance in the relationship between depression, anxiety, stress, and smartphone addiction. In future studies, addressing possible mediating and moderating variables such as self-esteem, social support, and coping strategies may provide a more comprehensive examination of the factors influencing smartphone addiction.

This study investigated the mediating effect of EA in the association between depression, anxiety, stress, and SA among Turkish university students. The study findings suggest that EA mediated the association between depression, anxiety, stress, and SA within this demographic. It is evident that studying individuals' propensity for EA as a means to alleviate depression, anxiety, and stress, along with its impact on SA, holds significance for both prevention and intervention efforts. Previous research has demonstrated the effectiveness of ACT in reducing SA levels (Yu & Son, 2016). However, further exploration is warranted to assess the efficacy of prevention and intervention programs incorporating EA in mitigating SA. Workshop activities targeting depression, anxiety, stress, and the inclination towards EA in handling these negative experiences could prove beneficial in reducing SA levels among university students. These workshops could be integrated into counseling centers at universities to provide support and assistance to students grappling with SA issues.

Data Availability Statement: The data that support the findings of this study are available upon request from the corresponding author.

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ORIGINAL ARTICLE

Game Therapy as an Intervention for Computer Game Addiction and Loneliness among Primary School Students

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Main Points

- Computer game addiction is common among primary school children.
- It is well-established that there is a positive correlation between computer game addiction and loneliness in children and adolescents.
- Game therapy has a positive effect on computer game addiction in primary school children.
- Game therapy has a positive effect on loneliness levels in primary school children.

Abstract

The study aims to examine the effect of game therapy on computer game addiction and loneliness in children attending a primary school in Kocaeli. The study was carried out in a pre-test – post-test quasi-experimental design. Data were collected with a sociodemographic data form, loneliness scale for children, and children's computer game addiction scales. The intervention group ($n = 22$) and the control group ($n = 23$) were determined after the pretest data. The intervention group received game therapy for 6 sessions. Descriptive statistics, Kolmogorov-Smirnov, and Wilcoxon tests were applied in the analyses. The findings were calculated at a 95% confidence interval and a .05 significance level. As a result, it was revealed that children's computer game addiction ($p = .006$) and loneliness levels ($p = .041$) decreased statistically significantly after game therapy. It can be said that implementing more game therapy interventions, especially for primary school children, will have a positive effect on children's computer game addiction and loneliness levels.

Keyword: Computer game addiction, game therapy, loneliness, primary school child

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Introduction

Technology encompasses a wide range of technical systems and tools that significantly impact people's lives by simplifying the process of problem-solving and saving time. Therefore, technology has become indispensable to daily life (Roser et al., 2023). The Internet, a key product of technological advancement, is utilized by roughly two-thirds of the global population according to 2023 statistics (InternetSociety.org, 2024). Data from the Turkish Statistical Institute shows that, in 2022, 94.1% of households in Türkiye had access to the Internet at home. This suggests that nearly the entire population has widespread and convenient access to

the Internet. The rapid expansion of Internet use continues to shape the lives of nearly all individuals, with both positive and negative effects (TÜİK, 2022).

With advancements in Internet technology and easier access, online games have become a platform for entertainment, leisure, and socialization. Therefore, they have become popular activities for children, adolescents, and young adults (Liu & Chang, 2016; Zhu & Chen, 2021). The exciting features provided by computer games played online or offline, such as multiplayer games, encourage users to spend more time playing games (Montag et al., 2021). Game addiction is defined as a compulsive or

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uncontrollable addiction that results in a severe loss of control over gaming habits and negatively impacts self-care, interpersonal relationships, and school/work life (Alzahrani et al., 2017; clevelandclinic.org, 2022; Lee & Kim, 2017). Game addiction is especially common among adolescents and children, causing serious problems in individuals' lives (Ustinavičienė et al., 2016). Computer game addiction, which is common in children, negatively affects psychological balance, sleep quality, academic performance, and especially social relationships (Aziz et al., 2021). Meanwhile, it can cause children's social relationships to deteriorate, thus increasing loneliness (King & Delfabbro, 2016; Toker & Baturay, 2016). Game addiction negatively affects communication, disrupts social communication and interaction, and pushes individuals toward loneliness. Students and adolescents, particularly at the primary school level, who lack the knowledge to use the Internet correctly and effectively, are considered the highest risk group (Akarsu & Akgün Kostak, 2022).

Perlman and Peplau define loneliness as a distressing psychological condition that arises when an individual recognizes a disparity between their current social relationships and the desired social connections (Perlman & Peplau, 1986). Loneliness indicates that there are significant deficiencies in an individual's relationships and that their interpersonal relationship skills are inadequate. For children, loneliness is more specifically defined as the subjective emotional experience of alienation and dissatisfaction based on one's own perceptions of their social status and friendship status in a peer group (Maes et al., 2015). Establishing successful relationships with peers is an important indicator of children's social competence (Kök Eren & Örsal, 2018). Children aged 9 – 10 begin to socialize during this period, and learning and school success gain importance at this age. Social development is characterized by acquiring knowledge and skills that enhance interactions within the school, family, and broader community, as well as fostering effective communication with others. Emotional development refers to the skill of understanding and controlling emotions while engaging in effective communication with others (Malik & Marwaha, 2022). Stockdale and Coyne (2018) found that in a study on computer game addiction, individuals experienced emotional problems, including depression and anxiety, and felt more socially isolated (Stockdale & Coyne, 2018). Guo et al. (2020) found that Internet use prevents children from socializing and causes individuals to experience challenges in face-to-face communication alone (Guo et al., 2020). Traş (2019) found that adolescents with Internet addiction were significantly associated with loneliness (Traş, 2019). In another study, it was stated that mobile game addiction was associated with depression, loneliness, and social anxiety (Wang et al., 2019).

As stated, children's play is important for both their social and emotional development (Malik & Marwaha, 2022). Encompassing a wide range of fields, play is an activity that constitutes the most natural aspect of life. Play, which is as important as basic life needs for children, prevents neuron loss by helping the development of synapses in the brain. Game therapy is a method applied by trained game therapists that aims to solve children's psychosocial problems, socialize, and increase the level of development. Children often cannot sit and talk about their problems for as long as adults expect. Children often prefer not to discuss their problems directly as adults

might; instead, they tend to express themselves spontaneously through play. Game therapy is effective in helping children express themselves, reveal problems, and reveal their feelings (Swank, 2008).

A study found in the literature revealed that a psychoeducation program based on cognitive-behavioral game therapy had a significant impact on reducing both game addiction and aggression levels (Söylemez & Ayas, 2023). After the game therapy was applied to primary school children, it was reported that students' aggression levels decreased (Kourosh et al., 2019). Game therapy applied to hospitalized children decreased anxiety levels during their hospital stay and decreased pain levels due to the intervention (Godino-Iáñez et al., 2020). An improvement in quality of life was observed following a game therapy intervention centered on the parent – child relationship for preschool-aged children (Aghdam et al., 2020). Game therapy applied to children is seen as an opportunity to solve psychosocial problems and socialize the child. Since children are an important determinant for the future of society, interventions that support social and emotional development are an important factor in raising healthy children. Considering this information, it is believed that children's game addiction may cause deterioration of social relationships and thus increase loneliness.

As per the regulation released by the Ministry of Health in 2011, school health nurses are responsible for identifying the health priorities of students and for planning and implementing comprehensive nursing interventions aimed at promoting positive mental health as part of health protection and development efforts (Republic of Türkiye Ministry of Health, 2011). Accordingly, it is very crucial for nurses to carry out practices that contribute positively to increasing mental and social health, growth, and development by considering the problems detected in students while planning their interventions. They should identify the causes that lead to social, behavioral, physical, or academic problems in students' growth and development processes at an early stage, plan appropriate nursing interventions, and evaluate the results.

A literature review indicates that there are limited studies investigating the effects of game therapy on improving quality of life, decreasing aggressive behaviors and game addiction, and reducing anxiety in children (Aghdam et al., 2020; Godino-Iáñez et al., 2020; Kourosh et al., 2019; Söylemez & Ayas, 2023). It is believed that game therapy could positively influence the levels of addiction and loneliness in primary school children struggling with computer game addiction. This study aims to investigate the impact of game therapy on reducing computer game addiction and loneliness among primary school students.

Material and Methods

Research Design

This study employs a quasi-experimental design, incorporating both pre-test and post-test measurements.

Hypothesis of the Study

Game therapy has an effect on reducing computer game addiction and loneliness.

Population/Sample of the Study

In this study, 9 – 10 age group students (fourth-grade students) in a primary school affiliated to the Provincial Ministry of National Education in Kocaeli province constituted the study population.

Inclusion criteria: Being 9 – 10 years old, studying in the relevant primary school affiliated to the Provincial Ministry of National Education, having no psychosocial barriers to communication, agreeing to take part in the study, and obtaining informed consent from both parents and the child.

Exclusion criteria: Refusal to join the study, not speaking Turkish.

Children meeting the inclusion criteria were incorporated into the sample using the G Power 3.1.9.4 software. The calculation for the sample size was based on a confidence level of .05, a statistical power of 90%, and a medium effect size, as recommended by the referenced study (Ugurlu et al., 2016) was calculated that at least 36 children in total should constitute the sample. A stratified randomization method was applied. In determining the groups, the “Children’s Computer Game Addiction Scale” was first applied to four branches in the fourth grade. After the pre-test data of the research was received, the two branches with the highest computer game addiction were included in the intervention group ($n = 23$) and the other two branches were included in the control group ($n = 22$).

Data Collection Tools

Data were collected face-to-face between December 2023 and January 2024 using the Socio-demographic Data Form, Loneliness Scale for Children, and Child Computer Addiction Scale.

Socio-demographic Data Form: The form, developed by the researchers based on the literature, includes questions for children regarding their gender, the presence of Internet and tablets at home, the availability of a personal room, and who makes decisions about the games played and their duration (Kök Eren & Örsal, 2018; Ugurlu et al., 2016).

Loneliness Scale for Children: Turkish adaptation studies of the scale developed by Asher, Hymel, and Renshaw (1984) to determine the loneliness levels of children were conducted by Kaya (2005) (Asher et al., 1984; Kaya, 2005). The scale consists of 24 items. Ten items (3, 6, 9, 12, 14, 17, 18, 20, 21, and 24) have negative meanings. Six items (1, 4, 8, 10, 16, and 22) have positive meanings. Eight items (2, 5, 7, 11, 13, 15, 19, and 23) are used as fillers. Scores from the scale are calculated over 16 items. The scale is scored on a five-point Likert-type scale, where the answer “It is not always true for me” is given a score of 5, while the answer “It is always true for me” is given a score of 1. The scale has a single-factor structure, and the increase in the total score indicates an increase in the level of loneliness. The minimum score that can be obtained from the scale is 16, and the maximum score is 80. The reliability score of the scale was found to be .87.

Child Computer Game Addiction Scale: Children’s computer game addiction scale is a 5-point Likert-type scale developed by Horzum et al. (2008). The scale consists of 4 factors and 21 questions (Horzum et al., 2008). The lowest score is 21 and the highest score is 105. The sub-dimensions are “inability to quit the game,” “associating the game with life,” “disrupting tasks due to the

game,” and “preferring the game to other activities.” “Inability to quit the game” (items 1 – 10) has a minimum score of 10 and a maximum score of 50 points, internal consistency coefficient of .83. “Associating the game with life” (items 11 – 14) has a minimum score of 4 and a maximum score of 20 points, internal consistency coefficient of .60. “Disrupting tasks due to the game” (items 15-17) has a minimum score of 3 and a maximum score of 15 points, internal consistency coefficient of .50. “Preferring the game to other activities” (items 18 – 21) minimum score of 4 and a maximum score of 20 points, with an internal consistency coefficient of .85. As the scale score increases, the level of addiction increases.

Implementation of Game Therapy

The game therapy intervention was implemented by the first author, an expert in public health nursing with a play therapy certificate, and the second author, an expert in mental health and psychiatric nursing. Before starting the implementation, the appropriate hours were determined by contacting the classroom teacher. Game therapy was completed over a total of six sessions. Each game therapy session was completed in approximately 45 minutes. The content of play therapy is given in Table 1 based on expert opinions. Therapy sessions were held on the same day and time every week in the same training room. The training room had tables and chairs suitable for the students (in terms of height and weight). There was adequate lighting, heat, and light. It was emphasized to the students that the activities carried out to avoid grade anxiety were not related to the lessons, and all these processes were treated sensitively. The authors used the *Publication Manual of the American Psychological Association* (APA, 2010) as a guide for using non-discriminatory language. Researchers treated students’ culture, religion, gender, or differences with respect.

It was difficult to keep the children’s concentration throughout the play therapy, but short breaks and engaging games were chosen.

The aim of the planned six sessions is to contribute to children’s cognitive development, emotional-social development, motor development, and language development. It was desired to create environments where children could express their feelings and reveal their creative skills. In this direction, after introducing ourselves as researchers, the first session of play therapy began with an activity of getting to know each other. In this activity, children were asked to stand up and form a circle, and the instructions of the activity were explained: “Each of us will move

Table 1.
Game Therapy Content

Session	Event Name	Duration
First session	Getting to know each other activity	45 minutes
Second session	Origami practice	45 minutes
Third session	Puzzle	45 minutes
Fourth session	Nique shapes with clay dough	45 minutes
Fifth session	Acrylic painting	45 minutes
Sixth session	The hat that introduced me	45 minutes

while saying our names. These movements can be any movement such as blinking, finger-snapping, head-scratching, turning around, jumping, or putting your hand on your waist. But before we do this, we will say the names of all those before us and repeat their movements. I will start by saying my name and doing a movement. Then your friend next to me will first say my name and repeat the movement I did. Then he will say his name and do another movement. Your next friend will first say my name and do the movement I did. Then he/she will say your second friend's name and do his/her movement, and finally, he/she will say his/her name and we will continue like this. Are we agreed?" Children were encouraged to help each other if they got stuck. In this way, it was ensured that unity within the class was supported, students who had limited communication with each other were brought together, and the researchers and children got to know each other more closely. In the origami activity, questions such as what can be made from paper and what is origami, etc., were asked and the answers were discussed. Sample origami works were shared with the children, and they were asked to design an example they wanted with the given materials or the work they chose to design themselves. Then, those who wanted to color their origami were allowed to do so, and the children were asked to tell a short story about the origami they made. The work was completed after listening to the stories of those who wanted. With the puzzle activity, students were given puzzles suitable for five different age groups. The students were divided into mixed-age groups, and the group that completed the puzzle in the shortest time was chosen as the first. The puzzles were exchanged between the groups to ensure their completion. At the end of the activity, the puzzles were given to the children who wanted to play again at other times. In the activity with clay dough, children were asked to make an original object that they liked and that they could use as an ornamental object in their rooms. All necessary materials were introduced and children were allowed to develop their hand skills first. Children who wanted to make more than one object were given the opportunity. It was also shared with the children that they could add to their objects by using ready-made shapes with clay dough. They were asked to write their names and surnames on their completed objects, and the activity was completed by leaving them in specified places to dry. During the activity, children were asked questions such as what the objects were, why they chose that object, and interacted with them. In the acrylic painting activity, the children were asked to paint the objects made of clay dough in the previous session, and various materials were provided to the children as they wished. Different colors and materials were allowed to be used to create original designs with acrylic paint. After the painting process was completed, all the painted objects were shared with the children by discussing what was painted on the objects, which colors they used and why, and where they planned to use these objects. Finally, in the hat activity that introduced me, a discussion was held with the children about the fact that each of us has unique and different characteristics, and that this makes us special and important. After the discussion, the children were asked to walk around the school garden, and each student was asked to choose an object that represents him/her and put it on his/her hat. They were then asked to decorate/paint their hats as they wished with the given materials. It was reminded that the chosen decorations/paintings should be the ones that reflect themselves in the best way. The activity was

concluded by discussing with the children who completed their hats in turn about the objects they chose and the decorations of their hats.

The game therapy took place in a meeting room at the school. A table arrangement was created for five different groups to increase interaction among children. Students were allowed to be together with different groups in each session. Prior to the activity, the researchers prepared the necessary materials in the meeting room. Only materials to be used in the specified activity were kept in the game therapy room. Students were given the opportunity to purchase materials of their own choosing. During the activity, the goal was shared, materials were introduced, and children's creative ideas were supported. The children were allowed to share the products with their families. In this way, the families shared with the class teachers and the researchers what kind of similar activities they liked and were interested in as an alternative within the scope of indoor play in the future. In each activity, each child was given the opportunity to share his or her feelings and thoughts about the product he or she designed or created.

Dependent/Independent Variables

In the context of the research, game therapy serves as the independent variable, while the total and sub-dimension score averages from the pre-test and post-test scales represent the dependent variables.

Evaluation of the Data

The study data were entered into a computer and analyzed using the Windows IBM SPSS 24.0 (IBM SPSS Corp.; Armonk, NY, USA) statistical software. Descriptive statistics (such as frequency, percentage, mean, and standard deviation) were employed to assess the descriptive data. The Kolmogorov-Smirnov test was utilized to determine the normality of the data distribution, while the Wilcoxon test was applied to analyze the total scores and sub-dimension scores from the scales. A significance level of $\alpha = .05$ was established, corresponding to a 95% confidence interval.

Ethics of Research

Ethical approval for the research was obtained from the Ethics Committee for Non-Interventional Studies of Kocaeli Health and Technology University (dated: March 24, 2023, reference number: 2023-35). Institutional authorization was granted by the Kocaeli Directorate of National Education (dated: December 1, 2023, reference number: E-99332089-605.01-91039350). Permission to use the scales employed in the study was acquired from the author via email. Written informed consent for participation was obtained in writing from both parents and students.

Results

It was found that 51.1% of the students participating in the study were male, 77.8% had their own room at home, and 62.2% owned a tablet. It was determined that 86.7% of the students had Internet at home and 62.2% of them stated that their income level was equal to their expenses. It was found that 28.9% of the mothers and 86.7% of the fathers were working, 53.3% of the mothers determined the time spent playing games, and 71.1% of the students decided on the game to be played. The findings indicated that the students predominantly engaged in sports games (82.2%), intelligence games (68.9%), and fighting games (53.3%),

Table 2.
Some Socio-Demographic Characteristics of the Students (n = 45)

	Intervention Group (n = 23)		Control Group (n = 22)		Total (n = 45)	
	n	%	n	%	n	%
Gender						
Woman	12	52.2	10	45.5	22	48.9
Male	11	47.8	12	54.5	23	51.1
Having one's own room in the house						
Yes	19	82.6	16	72.7	35	77.8
None	4	17.4	6	27.3	10	22.2
Having your own tablet at home						
Yes	12	52.2	16	72.7	28	62.2
None	11	47.8	6	27.3	17	37.8
Availability of Internet at home						
Yes	20	87	19	86.4	39	86.7
None	3	13	3	13.6	6	13.3
Income status						
Income is less than expenses	3	13	7	31.8	10	22.2
Income equals expenses	18	78.3	10	45.5	28	62.2
Income exceeds expenses	2	8.7	5	22.7	7	15.6
Mother's working status						
Working	6	26.1	7	31.8	13	28.9
Not working	17	73.9	15	68.2	32	71.1
Father's working status						
Working	21	91.3	18	81.8	39	86.7
Not working	2	8.7	4	18.2	6	13.3
Types of games played*						
Mind games	20	87	11	50	31	68.9
Profession games	17	73.9	3	13.6	20	44.4
Sports games	23	100	14	63.6	37	82.2
Racing games	8	34.8	10	45.5	18	40
Cartoon character games	8	34.8	8	36.4	16	35.6
Skill games	12	52.2	7	31.8	19	42.4
Fighting games	10	43.5	14	63.6	24	53.3
Who decides the amount of time played?						
Myself	7	30.4	10	45.5	17	37.8
Mother	14	60.9	10	45.5	24	53.3
Father	1	4.3	0	0	1	2.2
Sister/brother	1	4.3	2	9.1	3	6.7
Who decides the game played?						
Myself	17	73.9	15	68.2	32	71.1
Mother	5	21.7	3	13.6	8	17.8
Father	1	4.3	4	18.2	5	11.1
At what time are games played the most?						
09:00-11:00	3	13	4	18.2	7	15.6
11:00-14:00	9	39.1	5	22.7	14	31.1
14:00-17:00	7	30.4	10	45.5	17	37.8
17:00-20:00	4	17.4	3	13.6	7	15.6
How many hours a day do you play games?	$X^{\pm} \pm SS = 2.91 \pm 1.4$ (Min:1 – Max:8)		$X^{\pm} \pm SS = 3.27 \pm 1.8$ (Min:1 – Max:9)		$X^{\pm} \pm SS = 3.09 \pm 1.6$ (Min:1 – Max:9)	
How many hours a week do you play games?	$X^{\pm} \pm SS = 20.39 \pm 9.8$ (Min:7 – Max:72)		$X^{\pm} \pm SS = 23.68 \pm 14.4$ (Min:7 – Max:72)		$X^{\pm} \pm SS = 22 \pm 12.3$ (Min:7 – Max:72)	

*Children gave more than one answer.

Table 3.
Distribution of Students' Responses to the Computer Game Addiction Scale (n = 45)

	Pre-Test					Post-Test				
	Can't Quit the Game X ⁻ ± SS	Relating the Game to Life X ⁻ ± SS	Disrupting Tasks Due to Gaming X ⁻ ± SS	Preferring Gaming Over Other Activities X ⁻ ± SS	Scale Total X ⁻ ± SS	Can't Quit the Game X ⁻ ± SS	Relating the Game to Life X ⁻ ± SS	Disrupting Tasks Due to Gaming X ⁻ ± SS	Preferring Gaming Over Activities X ⁻ ± SS	Scale Total X ⁻ ± SS
Intervention Group (n = 23)	21.95 ± 8.87	8.43 ± 3.34	4.91 ± 2.59	11.56 ± 3.65	46.86 ± 14.03	20.30 ± 8.36	5.86 ± 3.69	3.69 ± 1.66	5.39 ± 2.42	35.30 ± 14.17
p [*] /W ^{**}	0.006/-2.723									
Control Group (n = 22)	23.22 ± 11.64	8.04 ± 3.72	4.5 ± 1.97	8.95 ± 5.13	44.72 ± 19.89	26.04 ± 8.12	8.13 ± 4.02	4.40 ± 2.61	8.54 ± 4.58	47.13 ± 16.77
p [*] /W ^{**}	0.614/-0.504									

*p < .05, **Kruskal-Wallis test.

Table 4.
Distribution of Students' Responses to the Loneliness Scale (n = 45)

	Pre-Test X ⁻ ± SS	Post-Test X ⁻ ± SS	p/W ^{**}
Intervention group (n = 23)	75.30 ± 5.23	71.52 ± 7.91	0.041*/-2.040
Control group (n = 22)	75.81 ± 6.91	72.95 ± 55.77	0.101/-1.641

*p < .05, **Kruskal-Wallis test.

respectively. Additionally, the majority of students played games on the computer primarily between 14:00 and 17:00 (37.8%). The students reported an average of 3.09 ± 1.6 hours per day and 22 ± 12.3 hours per week spent playing games (Table 2).

The mean total score for computer game addiction among students in the intervention group was 46.86 ± 14.03 before the intervention and decreased to 35.30 ± 14.17 after the intervention, with a statistically significant difference observed between pre-test and post-test scores ($p = .006$). The students demonstrated reduced scores in all sub-dimensions of computer game addiction in the post-test compared to the pre-test, with the most notable reduction in the sub-dimension related to preferring games over other activities. In contrast, the control group's average total score for computer game addiction increased from 44.72 ± 19.89 to 47.13 ± 16.77 post-intervention ($p = .614$). The control group showed a decrease only in the sub-dimension of preferring games over other activities, while their scores increased in other sub-dimensions from pre-test to post-test (Table 3).

The mean total score for students in the intervention group was 75.30 ± 5.23 in the pre-test and 71.52 ± 7.91 in the post-test, and this difference between the mean total scores on the loneliness scale was statistically significant ($p = .041$). The mean score of the students in the control group was 75.81 ± 6.91 in the pre-test and 72.95 ± 55.77 in the post-test, but there was no statistically no significant difference between the pre-test and post-test ($p = .101$) (Table 4).

In this study, the Child Computer Game Addiction Scale's Cronbach's alpha value was .90. The subdimensions are as follows: Inability to quit the game is .88, Associating the game with life is .60, Disrupting tasks due to the game is .67, and Preferring the game to other activities is .72. The Loneliness Scale for Children's alpha value was .69 (Table 5).

Table 5.
The Reliability of the Scales and Sub-Scales

Scales-Sub-Scales	Cronbach Alpha
Child Computer Game Addiction Scale	.90
Inability to quit the game	.88
Associating the game with life	.60
Disrupting tasks due to the game	.67
Preferring the game to other activities	.72
Loneliness Scale for Children	.69

Discussion

This study aimed to evaluate the impact of game therapy on computer game addiction and loneliness in children. The findings indicate that, following the intervention, the post-test scores for computer game addiction among children in the intervention group decreased significantly, with reductions observed across all sub-dimensions of computer game addiction. In the literature, there are limited studies investigating the effect of game therapy on computer game addiction (Soltani & Farhadi, 2021). Soltani and Farhadi (2021) found that play therapy applied by parents to their preschool children reduced computer game addiction. When other studies on computer game addiction in the literature are examined, a study conducted by Söylemez and Ayas (2023), it was found that game addiction decreased immediately after the cognitive behavioral game therapy-based psychoeducation program and at the third-month follow-up. In another study, it was determined that the use of motivational interviewing techniques reduced computer game addiction (Özcan & Çelik, 2021). The findings obtained in this study are similar to the results of different initiatives in the literature. Today, children have easy access to computer games, which may lead to uncontrolled computer game playing. Therefore, computer game addiction has become widespread. These addictions may cause children to waste time, negatively affect academic achievement, and compromise social time activities (Tuncer Şener & Yorulmaz, 2023). It can be said that game therapy is an effective method to reduce computer game addiction in primary school children.

The loneliness levels of the students in the intervention group decreased after game therapy. This finding is similar to studies in the literature (Amini et al., 2016; Kaboodi, 2023). It is stated that children feeling lonely can increase addiction to computer games (Genç et al., 2018). In addition, it has been determined that as computer game addiction increases, children's loneliness levels also increase (Kavlak et al., 2022). Therefore, loneliness and computer game addiction mutually affect each other. Game therapy can be considered an effective method to avoid the negative consequences of game addiction and loneliness in children.

Limitations and Directions for Future Study

This study is limited to children studying in a primary school affiliated to the Provincial Ministry of National Education in Kocaeli province. Game therapy sessions can be enhanced by increasing the number of sessions and diversifying their content in ways that children can be interested, fun and contribute to social and mental development for children. Implementing the intervention after randomization based on children's computer game addiction scale scores will increase the level of evidence of the study. A follow-up test can be applied to measure the effectiveness of game therapy. In order to ensure more consistent statistical values in future studies, the number of participants in the intervention and control groups should be over 30. Item-level analyses can be conducted in future research to improve comprehensiveness and distinctiveness.

Data Availability Statement: The data that support the findings of this study are available upon request from the corresponding author.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Kocaeli Health and Technology University (Date: March 24, 2023, Approval No: 2023-35).

Informed Consent: Written informed consent was obtained from students and parents of the students who agreed to take part in the study.

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ORIGINAL ARTICLE

Examining University Students' Opinions on Online Gambling Behaviors, Motivations, and Negative Effects: A Qualitative Analysis Study

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Main Points

- University students demonstrate a significant involvement in online gambling, with the majority engaging in these activities regularly, often daily or several times a week.
- Smartphones are the most used devices for online gambling among university students, providing ease of access and contributing to habitual gambling behavior.
- The study reveals that university students primarily engage in online gambling for social interaction, excitement, and the desire to earn substantial amounts of money quickly and easily.
- Illegal online gambling sites are preferred by a notable number of university students, exposing them to legal risks and potential cyber threats.
- Online gambling has significant negative impacts on students' physical and mental health, including issues like insomnia, stress, and deterioration of social relationships.

Abstract

This study investigates the phenomenon of online gambling among university students, focusing on its underlying factors and the negative consequences it entails. At a Turkish government university, a total of 40 students have confessed to engaging in online gambling. The inquiry utilized the methodology of phenomenology. The results were derived from a process of content analysis. The analysis involved tabulating the codes, sub-themes, and themes according to the research sub-problems. The interpretation was based on direct quotes. The participants devoted an average of 1 – 2 hours each day to participating in online gambling platforms at least once a week, ranked by frequency. Typically, participants utilize smartphones to access appropriate platforms and show a preference for slot machines and iddaa/match betting. Research indicates that individuals who engage in both legal and criminal online gambling sites are driven by social motivations, the thrill of the activity, and the aspiration to generate income. Ultimately, the research concluded that engaging in online gambling leads to bodily ailments, the compulsion to conceal it from loved ones, feelings of sorrow or discontentment due to financial losses, and detrimental impacts on social relationships.

Keywords: Behaviors, Motivation, Online Gambling, University Students.

Introduction

Gambling has been a prevalent form of entertainment and risk-taking behavior throughout history, often driven by the allure of financial gain

and excitement (Secades-Villa et al., 2024). From traditional forms such as card games, lotteries, and casino activities to more modern iterations, gambling has continuously evolved alongside societal changes (Griffiths, 2003). Technological

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advancements, particularly in recent decades, have played a pivotal role in reshaping gambling habits. Some scholars argue that technology not only propels the gambling industry but also introduces many individuals to their first gambling experience, often making it more appealing than earlier, non-technological forms (Griffiths, 1999).

The emergence of “internet gambling” or “online gambling” has marked a significant shift, referring to betting and gaming activities accessible through computers, mobile phones, and other internet-enabled devices such as smartphones, tablets, and digital TVs (Gainsbury, 2015). Over the past two decades, exponential advances in technology, particularly the internet, have made remote gambling sites increasingly accessible (Colado et al., 2017). Online gambling encompasses various forms, including sports betting, online poker, casino games, lotteries, and sports betting (Littler & Jarvinen-Tassopoulos, 2018). Notably, sports betting, often widely advertised, predominantly targets young men, creating significant concerns regarding its influence (Lopez-Gonzalez et al., 2017; Hollén et al., 2020). The accessibility and appeal of these activities have been further amplified by websites and mobile apps, which are designed to be increasingly engaging, efficient, and cost-effective as internet technologies continue to evolve (Effertz et al., 2018). Online gambling poses significant risks to young people, particularly due to their widespread use of mobile internet and smartphones (González-Roz et al., 2017). These risks include financial losses, strained social relationships, addictive behaviors, and psychological distress (Allami et al., 2021; Black & Allen, 2021; Chóliz, 2016; Effertz et al., 2018; Melodia et al., 2020; Thorne et al., 2021; Williams et al., 2021).

The convenience and autonomy offered by internet gaming platforms, combined with the ease of identity concealment, have contributed to the growing prevalence of online gambling (Griffiths, 2003). This behavior is considered risky, with the potential to become widespread and result in serious economic, educational, developmental, and health-related repercussions for individuals, societies, and nations (Blake et al., 2019; Gómez et al., 2020; Vijayakumar & Vijayakumar, 2023; Vayisoglu et al., 2019). Initially, online gambling behavior was predominantly observed among males aged 40 to 59 (Gainsbury et al., 2012). However, recent studies indicate a significant shift, with younger individuals engaging in online gambling at increasing rates. For example, a study by Gómez et al. (2020) found that the prevalence of online gambling among the younger population has tripled in recent years. Similarly, with the widespread access to the internet in Turkey, 80% of young people encounter virtual gambling platforms. This rate shows that virtual gambling addiction is spreading rapidly in Turkey, especially among children and young people (Toy, 2024). This increased online gambling behavior among young people also increases the risk of developing an online gambling disorder (Griffiths et al., 2009; Olason et al., 2011). An examination of the literature reveals that individuals engage in gambling for a variety of distinct motives. The factors influencing gambling behaviors include genetic predispositions, activation of the brain’s reward center through neurotransmitters, and socio-economic influences such as residing in a gambling environment, aspirations for easy wealth, entertainment, and accessibility to gambling, especially in the absence of legal constraints (Lee et al., 2007; Clark, 2014; Cakici, 2019).

Additionally, psychological mechanisms, including thrill-seeking, evasion of distress, inclination to socialize, and cognitive beliefs such as rapid financial gain and guaranteed success, play a significant role. These motives can be broadly categorized as socialization, entertainment, issue avoidance, thrill-seeking, and financial incentives (Lorains et al., 2011). However, these motivations and the demographic characteristics of participants, according to the economic and social conditions of the region, may vary. Notably, the gambling behaviors, motivations, and effects of online gambling among young individuals, who are adept at using the internet and technological tools, may differ from other groups. Therefore, identifying these specific behaviors and motivations among young people is crucial for reducing and preventing the risk of online gambling addiction.

Theoretical Background

In this context, the behaviors, motivations, and consequences of online gambling can be better understood through theoretical frameworks such as Social Cognitive Theory (SCT) and Theory of Planned Behavior (TPB) (Korsakienė et al., 2024). SCT emphasizes the interaction between individuals’ personal factors, behaviors, and environmental influences (Bandura, 1986). The theory posits that individuals learn by seeing the behaviors of others and the anticipated bad or positive consequences that follow. Consequently, seeing alternative behaviors allows an individual to deduce the outcomes and effects generated by such behaviors (Bandura, 2001). The theory has been widely applied in various fields, aiming to reveal the influence of individual behavior (Ariyabuddhipongs, 2006; Korsakienė et al., 2024; Sarti & Triventi, 2017; Zhou & Wu, 2024). Online gambling behaviors often arise from the dynamic interaction of these elements, such as peer influences, personal motivations, and technological accessibility. For instance, students’ gambling tendencies may be shaped by the desire to fit into social groups or by observing the gambling behaviors of their peers (Wood & Griffiths, 2008). The dynamic interaction between personal and environmental factors, as emphasized by SCT, provides a framework for understanding how peer behaviors and technological convenience jointly influence students. Therefore, the theory seems appropriate for this study.

TPB (Ajzen, 1991), based on social cognition theories, offers a systematic framework for comprehending the intention to participate in online gambling. The TPB posits that individuals make rational decisions based on available information, which mediates the relationship between belief-based constructs—such as attitudes, subjective norms, and perceived behavioral control—and subsequent behaviors (Hagger & Hamilton, 2024). In the realm of gambling, intentions are influenced by attitudes about gambling (e.g., perceiving it as a rapid source of revenue), subjective norms (e.g., approval from peers), and perceived behavioral control (e.g., accessibility through mobile devices). The idea has been utilized in other fields, but its application in elucidating gambling behavior has garnered considerable interest just in the past decade (León-Jariego et al., 2020; Martin et al., 2010; Wang et al., 2021; Wu et al., 2012). Smartphones and mobile applications, by enabling easy access to gambling platforms, substantially improve perceived behavioral control, thereby elevating the probability of gambling participation (Chóliz, 2016). This renders

the TBP especially pertinent for comprehending how attitudes, social perceptions, and accessibility jointly affect individuals' intentions toward online gambling.

Demographics, Behavioral Patterns, and Motivations for Online Gambling

The number of studies on internet gambling behavior and addiction is increasing worldwide. Research consistently shows that men are more likely to engage in online gambling compared to women, particularly in sports betting and strategic games (Adu-Akoh and Kwarteng-Nantwi, 2023; Firat, 2015; Pinarci, 2014; Siran, 2020; Potenza et al., 2001; Prakash et al., 2024; Williams et al., 2021). However, women are also likely to gamble online in different activities, although less than men (Wardle et al., 2011). When studies examining gambling frequency, reasons, and motivations are considered, several key findings emerge. In a study conducted by Griffiths and McCormack (2010), a main theme related to the motivation to gamble online, namely more gambling opportunities, and four sub-themes, namely convenience, value for money, more game variety, and anonymity, were revealed. In support of the sub-themes, the results of a study conducted in Ghana with university students showed that the preferred online betting of university students is sports betting, and the motivation is to earn money (Adu-Akoh and Kwarteng-Nantwi, 2023). An Irish study of 208 participants revealed that sports betting and mobile app access are the most preferred online gambling methods, with financial gain and emotional satisfaction being the primary motivations (Columb & O'Gara, 2018). Similarly, Williams et al. (2006) reported that over 72% of Canadian students had gambled in the preceding six months. A Canadian study further highlighted that substance use behaviors like smoking and alcohol consumption, involvement in high-risk gambling activities such as electronic gambling machines (EGMs), and socioeconomic vulnerabilities are significantly associated with problem gambling, both online and offline (Williams et al., 2021). In the study conducted by Gainsbury et al. (2016), social casino games were emphasized, and it was stated that social casino games triggered real-money gambling behavior in young adults, and the main motivations for this behavior were the desire to win real money and entertainment. In Turkey, a study conducted with 339 university students reported that 41.4% had gambled at least once, 21.5% within the past month, and 15.3% online. Among these, "İddaa (Bet)" emerged as the most popular gambling method, played by 80.7% of participants. Also, the main motivation was determined to be thrill-seeking in this study (Vayisoglu et al., 2019). Siran (2020) similarly found that 39.4% of university students engaged in gambling, with the national lottery (18.8%) and internet betting (18.6%) being the most preferred. In addition, 26.7% of students reported having a friend with gambling issues, while 11.9% indicated a family member with similar problems. Further research highlights specific predictors and outcomes of gambling behavior. Koc et al. (2023) reported that university students' gambling behavior significantly differed according to gender, family structure, income level, sense of achievement, happiness, psychological distress, satisfaction with social relationships, and substance use such as smoking and alcohol. Dinc et al. (2020) found that high school students cited reasons for online gambling such as earning easy money, peer influence, and the desire for acceptance. Karabrahimoglu et al. (2023), in a study with 449 university students, identified

that 35.0% of the group was addicted to online gambling and that loneliness levels were significantly higher among addicted individuals compared to non-addicted peers. In one of the recent studies conducted in Turkey, it was found that online addiction score was associated with age, low grades, alcohol use, low family communication, and dissatisfaction with life (Sen & Pirincci, 2024). Although the frequency and duration of online gambling may vary, increasing studies and reports of social community organisations consistently indicate an upward trend in university students' online gambling behaviors (McBride & Derevensky, 2012; Sarsilmaz, 2021).

Purpose of the Present Study

Overall, the findings emphasize the complex interplay of social, economic, and psychological factors driving online gambling among university students. Despite the prevalence of online gambling studies in global literature (Calado et al., 2017; Columb & O'Gara, 2018; Gainsbury et al., 2019; Ghelfi et al., 2024; McCormack & Griffiths, 2012; Williams et al., 2021; Williams et al., 2006; Secades-Villa et al., 2024), Turkish academic research on online gambling remains limited (Vayisoglu et al., 2019; Dinc et al., 2020). Particularly in Turkey, there is a critical need for studies that aim to determine why university students engage in online gambling and to understand their underlying motivations. This research gap becomes even more pressing when considering the exacerbating effects of the COVID-19 pandemic. Social isolation, limited opportunities for socialization, and heightened concerns about health and the future have collectively intensified issues related to substance use, behavioral addictions, and gambling behaviors during this period (Price, 2022). Increased leisure time and reliance on internet-based entertainment accelerated the transition to online gambling, reinforcing pre-existing habits and fostering new addictive behaviors (Avena et al., 2021; Quinn et al., 2022). Young men, in particular, were disproportionately affected by the rise in online gambling during lockdowns (Hodgins & Stevens, 2021). Given this substantial increase in online gambling, particularly among young people, it is crucial to investigate the patterns, motivations, and consequences of online gambling among university students in Turkey, especially those who are far from their homes or have minimal family supervision. Addressing this issue could provide valuable data to bridge the current literature gap and support the development of more effective strategies to combat online gambling addiction across all age groups.

In this respect, this study aims to explore the dynamic factors underlying the online gambling activities of university students through the lens of Social Cognitive Theory (Bandura, 1986; Wood & Griffiths, 2008) and the Theory of Planned Behavior (Ajzen, 1991). Accordingly, the following research questions were sought to be answered in this study:

1. What are the frequency and duration patterns of online gambling among university students (TPB)?
2. What are the preferences of university students with regard to:
 - (a) the technological devices for online gambling (SCT),
 - (b) the legality of their chosen platforms (SCT),
 - (c) the types of online gambling they engage in (SCT), and
 - (d) their motivations for online gambling (TPB)?
3. What are university students' opinions about the effects of online gambling on their lives (SCT)?

Material and Methods

This study was conducted with phenomenology method, one of the qualitative research methods, in order to examine university students' online gambling behaviours, motivations, and negative effects of these behaviours. Qualitative research aims to enable the reader to develop insight and sensitivity about human experiences (Knafl & Howard, 1984). Qualitative research can reveal how people make sense of and interpret a phenomenon (Denzin & Lincoln, 2005).

The phenomenological design emphasizes phenomena like events, sensations, perceptions, and circumstances that we recognize but do not fully comprehend (Yıldırım & Şimşek, 2018). Phenomenology allows for the examination of event progression in everyday life and provides foundational insights for assessing events derived from these studies (Ashworth & Lucas, 1998). In other words, it aims to distil human experiences into phenomena to elucidate the essence of global reality, events, or things (Creswell, 2007). This study employed a phenomenological methodology to elucidate the motivations and patterns of university students who play online gambling. The phenomenological research approach was chosen due to its efficacy in accurately representing experiences and perspectives while minimizing researcher bias (Tufford & Newman, 2012). Also, this strategy was favoured since it sought to comprehend the shared experiences of a substantial number of persons concerning an event.

Participants

The participants were determined using the maximum variation method, a type of purposive sampling. In this approach, the researcher exercises judgment to select participants who are most relevant to the research purpose. This method allowed for a diverse sample representing a wide range of demographic characteristics, experiences, and contexts (Patton, 2014). The sample size in qualitative research, as in this study, aims to reach theoretical saturation, which occurs when no new themes or information emerge during data collection (Guest et al., 2006; Hennink & Kaiser, 2022).

In this study, a sample of 40 university students studying at a state university in Turkey and engaging in online gambling was sufficient to achieve both diversity and saturation. Saturation refers to the point where data begins to repeat, indicating that an adequate sample size has been reached (Morse, 1991). Furthermore, the reliability of the research was enhanced through data triangulation, ensuring that the findings were comprehensive and consistent (Arastaman et al., 2018). This optimal sample size enabled the categories to be fully saturated, with repetitions in the data confirming the completeness of the analysis. The demographic characteristics of the participants are shown in Table 1.

When Table 1 is examined, it is seen that 85% ($f = 34$) are male and 15% ($f = 6$) are female. When the age range of the participants is examined, it is seen that there are 19 people between the ages of 10 and 20 and 21 people between the ages of 21 and 30. The study group mostly consists of people studying in the Department of Mechanical Engineering ($f = 12$). In the research, information reflecting the identities of the participants was not included by adhering to the principle of confidentiality of their

private and organizational identities. Instead, each participant was given a nickname between "K1" and "K40."

Data Collection

Semi-structured interviews are among the most effective and widely used qualitative research methods for systematically gathering information on people's knowledge, experiences, perceptions, attitudes, behaviors, and interpretations of various subjects (Yıldırım & Şimşek, 2018). Semi-structured interview questions were developed based on a review of relevant literature and consultation with experts in behavioral addictions. A pilot study was conducted with five participants to refine the questions for clarity and relevance (Guest et al., 2006). During February and March of the 2022 – 2023 academic year, the researcher conducted face-to-face interviews in a private and quiet university lecturer's office to ensure participants' comfort and confidentiality. This controlled setting was chosen to minimize distractions and create an environment conducive to open and honest discussions. Participants were invited to learn about the study's objectives, scope, and methods before each interview. Participation was voluntary, with no consequences for those who chose to withdraw at any stage. Participants were assured that the collected data would only be used for research purposes.

Repeated questioning was employed to ensure the collection of sufficient and comprehensive data. When participants did not fully understand a question, alternative phrasing was used to clarify the meaning (Shenton, 2004). Interviews lasted between 30 minutes and 1 hour. To enhance the study's credibility, participants were asked to review their interview transcripts to confirm that their experiences and interpretations were accurately represented (Guba, 1981). It was observed that participants occasionally expressed more than one opinion for certain questions.

All participants provided informed consent in line with the 1964 Helsinki Declaration and its later revisions. Consent was recorded during the interviews, and written consent forms were signed. These measures ensured ethical compliance and the protection of participants' rights. Ethics committee approval was obtained from Trakya University Social and Human Sciences Research Ethics Committee (Session No: 2022/03, Decision No: 2022.03.14, Decision Date: March 23, 2022).

Data Analysis and Process

Written documents containing the data obtained in the analysis part of the data were subjected to content analysis separately and independently by two researchers. The main purpose of content analysis is to reach concepts and relationships that can explain the collected data (Yıldırım & Şimşek, 2018). Certain codes were determined here, and themes were obtained based on these codes (Berg, 2001). The content analysis process in the study consisted of data preparation, data description, coding, categorization, examination of themes, and exhaustion of results (Braun & Clarke, 2006). Accordingly, the data collected within the scope of the research (e.g., interview records or documents) were transcribed and checked for accuracy. Subsequently, the data were read for the first time in line with the research questions, and main themes and recurring patterns were identified. The first themes obtained were placed in a certain framework, and open coding was performed. At this stage, the data were divided into parts, and each part was labelled with a code.

Table 1.
Demographic Characteristics of Participants

Demographic	Variables	Participants	f
Gender	Male	K1, K3, K7, K8, K9, K10, K11, K13, K14, K15, K16, K17, K18, K19, K20, K21, K22, K23, K24, K25, K26, K27, K28, K29, K30, K32, K33, K34, K35, K36, K37, K38, K39, K40	34
	Female	K2, K4, K5, K6, K12, K31	6
Age	10-20	K2, K3, K4, K6, K7, K9, K10, K12, K15, K18, K22, K23, K24, K29, K31, K35, K36, K37, K40	19
	21-30	K1, K5, K8, K11, K13, K14, K16, K17, K19, K20, K21, K25, K26, K27, K28, K30, K32, K33, K34, K38, K39	21
Department	Mechanical Engineering	K1, K7, K9, K13, K21, K22, K23, K25, K29, K30, K33, K37	12
	Computer Engineering	K5, K6, K19, K36	4
	Physical Education and Sports	K17, K28, K32	3
	International Relations	K4, K34, K35	3
	Econometrics	K18, K39, K40	3
	Nutrition and Dietetics	K2, K31	2
	Physiotherapy and Rehabilitation	K12	1
	Medical Laboratory Technician	K15	1
	Laboratory and Veterinary Technician	K16	1
	Marketing	K14	1
	Nursing	K10	1
	Aircraft Technology	K3	1
	Foreign Trade	K20	1
	Business Administration	K38	1
	Electronics	K11	1
	Hybrid and Electric Vehicles Technology	K24	1
	Radio and Television	K27	1
	Science Teaching Education	K26	1

Subcategories and then broader themes were formed by combining similar codes, and the internal consistency and external differences of the themes were evaluated; the compatibility of each theme with the research questions was reviewed. In addition, in the study, regardless of its type, validity and reliability, which is one of the important criteria at all stages of the research, from the creation of the conceptual framework of a scientific study to the presentation of the results, was made. In this context, the data set was coded independently by two researchers and the consistency between the two codings was calculated with the formula $\Delta = C \div (C + \alpha) \times 100$ (Miles and Huberman formula). In this formula, Δ : Reliability coefficient, C: The number of terms on which consensus is reached, α : The number of terms on which no consensus is reached, and the consensus rate between the two encoders should be at least 80% (Miles & Huberman, 1994). In this study, the reliability coefficient was found to be % 83.775. This rate represents a reliable level, according to Miles and Huberman (1994). In addition, it is stated in the literature that participant control, detailed description of the researched subject, and expert evaluation increase the credibility of the research (Arastaman et al., 2018). In this respect, the interview transcripts were sent to the participants, and the participants'

confirmation was provided. Finally, in order to further increase reliability, feedback was received from two experts in the analysis of the data.

Results

Findings on the Frequency of Online Gambling

Table 2 shows the frequency of online gambling, the first theme in this study on university students' online gambling behavior, motivations, and effects. Table 2 indicates that many college students bet online, with the majority doing so daily ($f = 9$) and two to three times a week ($f = 7$).

Supporting the data in Table 2, the direct opinions of some participants about the frequency of online gambling among university students are as follows:

K12(F): "I bet every day. I just can't put the phone down. I place my bets more on the match score than on touches or corners. I can say that it is on my mind every hour of the day."

K21(M): "I've been gambling for 3 years. I bet 4-5 days a week. It usually takes 3 - 4 hours when I start. I usually

Table 2.
Frequency and Daily Duration of Online Gambling

Theme	Sub Theme and Code	Participants	f
Frequency	Every day	K3, K6, K7, K8, K10, K12, K16, K36, K39	9
	2-3 days per week	K4, K15, K19, K20, K29, K31, K35	7
	4-5 days per week	K1, K9, K14, K21, K24, K30	6
	1-2 days per week	K5, K11, K25, K26, K34	5
	If there is enough money	K17, K28, K33, K40	4
	Erratically	K22, K27, K33	3
	3-4 days per week	K13, K37	2
	Every other day	K2, K32	2
	Biweekly	K38	1
Duration	1-2 hours	K18, K22, K24, K27, K32, K34, K36, K38, K40	9
	Erratically	K3, K4, K5, K7, K8, K13, K19, K26, K37	9
	3-4 hours	K1, K11, K21, K35	4
	2-3 hours	K14, K16, K17, K39	4
	5-6 hours	K9, K28, K29, K30	4
	0-1 hour	K20, K25, K31	3
	Till I am penniless	K15, K33	2

have free time after 10 – 11 at night, and that's when I begin gambling."

Findings on the Duration of Online Gambling

In the study's online gambling duration results, the frequency distribution of usage length was 1 – 2 hours ($f = 9$) and "it is changing" ($f = 9$). Table 2 summarizes the data on online gambling duration. Some university students' views on internet gambling's daily duration:

K7(M): "I've been gambling for 5 years. I place bets every day of the week. If I made daily coupons for the duration of an entire day, then I would have to spend all day watching matches. Depending on the type of gambling, my online gambling time varies during the day."

K32(M): "If I have to say, I bet a lot of money, but I study and work at the same time. I get paid every two days. I'm placing bets right now. I'd say twice a day. Game time depends on the case, but I think I bet for 1.5-2 hours on average."

Findings of the Preferred Technological Device for Online Gambling

Many participants did not name their preferred online gaming device. Additionally, several participants used computers ($f = 5$) and smartphones ($f = 13$) for online gambling. Table 3 contains data.

The direct views of some participants about the preferred technological device for online gambling by university students are as follows:

- K18(M): "I usually place bets with a smartphone. I do it on the computer when I'm at home. Since I can actively carry

the smartphone, I bet more with the smartphone than the computer."

- K19(M): "When I bet, I bet with mutual friends. I usually place bets with a smartphone. I do it on the computer when I'm at home. Since I can actively carry the smartphone, I bet more with the smartphone than the computer."

Findings on the Legality of Preferred Websites or Apps for Online Gambling

An intriguing tendency emerges from participants' online gambling website choices. Many respondents did not specify their favorite platforms. The data shows that some participants prefer illicit websites ($f = 13$), and others prefer lawful ones ($f = 12$). Table 3 details university students' opinions. Some participants' direct opinions on the legality of university students' favored online gambling sites:

- K31(F): "I play more slots, so we can say casino games. I use illegal sites and frankly, I didn't open a private account for myself because I was afraid of getting caught. We have one friend's account in our friends, and we use it as a joint account. I always go through it."
- K35(M): "I usually play İddaa. I play football, but sometimes I bet on tennis, basketball. I predict score or sometimes corners, touches. Sometimes I use legal and sometimes illegal sites. The reason I place bets using illegal sites is because I can get more by betting little."

Findings on the Preferred Type of Online Gambling

When the findings are examined in terms of the online gambling types preferred by the participants; it is seen that the online gambling types preferred by the participants on the internet are mostly slot ($f = 22$) and betting/match ($f = 16$). These are followed by casino ($f = 6$), betting ($f = 4$), sweet bonanza ($f = 4$),

Table 3.*Preferred Technological Device and Legality of Preferred Websites for Online Gambling*

Theme	Sub Theme and Code	Participants	f
From Where	Unspecified	K1, K6, ..., K11, K13...K17, K20, K21, K24,..., K30, K33,..., K38	25
	Smartphone	K2...K5, K12, K18, K19, K22, K23, K31, K32, K39, K40	13
	Laptop	K4, K18, K19, K22, K23	5
Where	Unspecified	K2, K3, K4, K5, K6, K7, K11, K14, K16, K17, K21, K22, K23, K25,..., K28, K30, K32, K38, K39, K40	22
	Illegal websites	K8, K9, K12, K15, K18, K19, K20, K29, K31, K33, K35, K36, K37	13
	Legal websites	K1, K9, K10, K13, K15, K18, K20, K24, K34, K35, K36, K37	12

roulette ($f=4$), and blackjack ($f=4$). Table 4 shows the data of the findings.

In addition, the direct views of some participants, which support the data emerging within the scope of the themes and codes obtained in Table 4, are as follows:

- K2(F): "I usually play Slot and Casino games. I love Sweet Bonanza and Gates of Olympus. "Grandpa" and "multipliers" in Gates of Olympus game seem interesting to me. Slot gives better money than other games. This is why I choose slot."
- K5(F): "In general, we play slots, that is, casino games, illegally. My father used to play games such as horse racing, but I did not see him. I just always heard. Why am I playing the slot? Because my friends were playing Sweet Bonanza. I saw the game, the colorful fruits were exploding, I liked it very much. I liked it very much; it was almost sweet. Officially I was hypnotized looking at it. So, I can say I prefer that."
- K10(M): "I preferred İddaa and match betting. It was the one recommended to me by my friends and relatives. I used to bet at İddaa dealers. Then a friend of mine said, now you can do it online from your phone without going to the dealer.

I immediately downloaded the application. I place bets on live, instant matches."

- K16(M): "I prefer casino games and İddaa. I'm actually good at betting. I make money, but casino games are attractive. I'm tempted by the screenshots, the sounds, and the way the safe can hit a very high balance. Their screens have beautiful symbols, different icons, and faces. There are thousands of games inside the casino. This sounds nice. I especially like the ones with fruit and animal symbols. Also, the bonus event in the slot encourages me."

Findings on the Motivations for Online Gambling

Table 5 shows participants' online gambling motivations. Table 5 shows that participants gambled online for

easier ($f=5$), love of sports/soccer=1, encouragement of family/father ($f=2$), encouragement of boyfriend ($f=3$), social environment ($f=18$), entertaining ($f=5$), earning money ($f=6$), being in the market ($f=1$), less chance of cheating ($f=2$), paying more money ($f=13$), being called by the game ($f=1$), exciting ($f=18$), good sounds ($f=5$), immediate visibility of the results ($f=9$), including tactics ($f=3$), advertising the winners ($f=1$), good graphics ($f=10$), love of horses ($f=1$), desire to earn more money ($f=18$), making easy money ($f=11$), spending time ($f=11$), getting

Table 4.*Preferred Type for Online Gambling*

Theme	Sub Theme and Code	Participants	f
Type	Slot	K2, K4, K5, K7, K8, K11, K14, K15, K16, K17, K18, K19, K20, K26, K27, K28, K29, K31, K32, K36, K39, K40	22
	Betting (İddaa)/Match	K6, K9, K10, K12, K13, K14, K15, K16, K18, K20, K25, K26, K34, K35, K37, K38	16
	Casino	K2, K5, K16, K19, K22, K32	6
	Blackjack	K7, K21, K23, K33	4
	Betting	K22, K24, K29, K36	4
	Sweet Bonanza	K2, K21, K26, K30	4
	Roulette	K7, K14, K21, K39	4
	Aviator	K4, K30	2
	Gates of Olympus	K2, K26	2
	Horse Racing	K1	1
	Allen Gator	K21	1
	40 Burning Hot	K15	1

Table 5.
Motivations of Online Gambling

Theme	Sub Theme and Code	Participants	f
Motivation	Social Environment	K5, K6, K7, K9, K10, K13, K15, K16, K19, K20, K23, K25, K30, K31, K34, K38, K39, K40	18
	Exciting	K8, K9, K15, K20, K21, K22, K23, K24, K26, K30, K31, K32, K33, K36, K37, K38, K39, K40	18
	Desire to earn more money	K1, K2, K3, K4, K5, K9, K10, K12, K14, K16, K17, K20, K21, K27, K28, K29, K31, K32	18
	Giving more money	K2, K8, K12, K15, K16, K18, K19, K23, K26, K28, K31, K37, K39	13
	Making easy money	K4, K11, K14, K16, K18, K23, K24, K25, K27, K32, K40	11
	Spending Time	K5, K15, K19, K20, K21, K22, K29, K30, K35, K36, K39	11
	Good Graphics	K4, K5, K14, K16, K18, K19, K28, K30, K39, K40	10
	Immediate visibility of the results	K14, K15, K17, K18, K19, K27, K31, K32, K39	9
	Earning money	K3, K6, K7, K8, K10, K19	6
	Love of sports/soccer	K9, K13, K24, K25, K34, K38	6
	Entertaining	K3, K4, K6, K7, K11	5
	Good sounds	K4, K14, K16, K19, K39	5
	Easier	K1, K6, K8, K10, K27	5
	Being a student	K2, K4, K10, K20	4
	Including tactics	K15, K20, K21	3
	Encouragement of boyfriend	K2, K4, K12	3
	Encouragement of family/father	K22, K26	2
	Less chance of cheating	K33, K37	2
	Being called by the game	K16	1
	Advertising the winners	K22	1
	Being in the market	K1	1
	Getting rid of negative thoughts	K6	1
	Love of Horses	K1	1

rid of negative thoughts ($f=1$) and being a student ($f=4$) sub-themes and codes are seen to come to the fore.

In addition, the direct views of some of the participants supporting the data obtained in Table 5 are as follows:

- K21(M): “I play games like Roulette, Blackjack (21), Sweet Bonanza, and Allen Gator. It would be much better if I used the money elsewhere. But playing these games has become a habit. After a while, like a cigarette, it started to give pleasure. It’s nice to watch and spend time with. It was good for my free time. It gets too exciting because the money in my pocket will either run out or get more. Sweet Bonanza makes money. Blackjack (21) is much more enjoyable because it is necessary to play more statistically.”
- K31(F): “I want to earn a lot of money, and instant money makes me happy and gives me pleasure. Also, I love the excitement, but the waiting time scares me and makes me nervous. I can’t take this exciting event as much as gambling from other things in life. There are many economic reasons why I play; I want to live in luxury. I don’t want to think about my money when I go somewhere, and when I earn money from the slot, I say that now I can eat my food,

drink my coffee, and travel as I want, but otherwise I must calculate. It is also fun to play with friends; we have fun, we exchange ideas, and we get excited.”

- K40(M): “Easy money. I play because I don’t have money. Besides, it’s easier to make money like this than to deal with something. It has to do with the economy. For example, I can’t buy anything, even with 200 TL in my pocket. For example, I go into gambling, I earn money from gambling, I go and buy it comfortably.”

Findings on the Life Effects of Online Gambling

As the final findings of the study, the themes and codes obtained in terms of the effect of online gambling on the lives of university students are shown in Table 6. When Table 6 is examined, there are 18 codes and sub-codes under the theme of the effects of online gambling on life. These are stress ($f=7$), shame ($f=1$), anxiety ($f=2$), nervousness ($f=1$), misuse of energy ($f=1$), and debt-related social isolation ($f=3$), ambition to win ($f=3$), hiding from family ($f=16$), hiding from mother ($f=1$), putting the family in a difficult position in society ($f=1$), negative impact on family relationships ($f=2$) physical effects (chin tremor, head tingling, sleep, hair pulling/loss, dreams, crying, smoking, focusing, increase in smoking/alcohol use, not doing sports) ($f=20$), loss of

Table 6.
Effects on Life of Online Gambling

Theme	Sub Theme and Code	Participants	f
Effects on Life	Physical effects (chin tremor, tingling in the head, sleep, hair pulling/shedding, dreams, crying, smoking, focusing, increased smoking/alcohol use, not doing sports)	K1, K4, K9, K10, K11, K12, K14, K15, K16, K17, K20, K21, K23, K28, K29, K30, K32, K33, K38, K39	20
	Hiding from family	K1, K2, K4, K6, K7, K10, K12, K15, K18, K20, K21, K30, K31, K33, K36, K38	16
	Being sad/depressed when losing	K7, K12, K14, K18, K20, K22, K23, K24, K25, K29, K31, K32, K37, K40	14
	Negative effect on friendship relations	K5, K8, K10, K11, K19, K21, K29, K30, K32, K33, K34, K39, K40	13
	Being so happy/hopeful when winning	K5, K6, K12, K17, K19, K22, K24, K25, K26, K40	10
	Stress	K1, K4, K5, K8, K17, K31, K39	7
	Negative impact on lessons	K5, K6, K20, K21, K29, K30	6
	Loss of Money	K2, K14, K19, K21	4
	Anxiety	K14, K15	2
	Negative impact on family relationships	K37, K39	2
	Debt-related Social Isolation	K10, K16, K23	3
	Ambition to win	K1, K2, K6	3
	Misuse of energy	K27	1
	Hiding from mother	K3	1
	Putting the family in a difficult position in society	K16	1
	Shame	K10	1
	Nervousness	K39	1

money ($f=4$), negative impact on lessons ($f=6$), being so happy/hopeful when winning ($f=10$) and being sad/depressed when losing ($f=13$).

Supporting Table 6, some of the opinions of university students on online gambling in terms of its impact on their lives are as follows:

- K5(F): "I mean, sometimes I sit with my friends. They say give me 200 TL. I say ok. But I don't want to play at all. At that moment, we are losing. I'm bored and I'm taking a trip right away. There is some resentment between us. If I win, I am very happy, and we share it with friends. I'm going to buy something right away. My family knows, even my mother sometimes gives me money so that I can double the money, and she never gets angry with me. It doesn't affect my lessons either because I play in my spare time. But if we bet in class, it's a big distraction. I totally follow the game. We even made a lot of money in the class once and left the class right away. We went for coffee. When I lose, I feel nervousness and regret. Why did I have to? My money is gone and now I can't seem to get what I want."
- K16(M): "I once had many friends. Over time, when I couldn't help playing too much and started to get into debt, my friends abandoned me. People started to have trust problems with me. People's point of view towards me is changing and has changed. I put the family in a very difficult situation because I have no property of my own. The family has assets.

My father always paid off my debts. If I have lost 1 million TL, it is my father's money. Without my father's support, I would be in a very difficult situation; all the family ties would also be severed. For example, I have a sister who is at odds with my father over this issue because, while I was supported so much by my family, she resented being marginalized. My sister's relationship with me is bad, and rightfully so. I spent all the money on gambling. My father's reputation in his circle was also hurt because of me. His relationships were dealt a blow. Sports have also affected my life. Because you are sleep deprived. The order of life is disrupted. You go to the football field; your mind is always in debt, always in the game. There are problems with focus."

- K32(M): "I think the biggest problem is insomnia. I am both studying and working. But I need to sleep. But when I start the game, I lose track of time; suddenly it is 3 o'clock (night). When I lose, I feel a bit low. This affects my concentration at work. No problems at school. The lessons are easy. Of course, there are some problems in my social life. There's school, there's work, and there's gambling. There is no time for sociality. Sometimes I place bets on off days when I'm not going to work. I retreat to a cafe and play in a corner. It's better if I socialize, but I don't know; it's like passion. Even if my girlfriends invite me to a place, if there is a slot game, I can't go without finishing it."
- K33(M): "My family is unaware that I bet large amounts of money. But what's interesting is that my father is the

one who taught me poker. However, he doesn't bet large amounts either. It doesn't have any impact on my academic performance or grades. I have a general problem with sleep, but I don't think it's related to gambling. The late school hours also contribute to that. When I play with a friend who is not very knowledgeable about gambling or with whom I'm not very close, we can end up with arguments."

Discussion

This qualitative study examined university students' online gambling activities, motives, and life effects. Male participants predominated. However, few women, especially slot machine players, participated. This conclusion matches the most linked study participant groupings. Kairouz et al. (2012) found that most internet gamblers were male students. Wood and Williams (2011) revealed that Canadian men gambled online more often and were younger. Turkish studies have indicated that men are more likely to engage in compulsive internet gambling than women (Dinc et al., 2020). Research suggests that women with psychological distress are more likely to engage in online gambling (Håkansson & Widinghoff, 2020; McCarthy et al., 2019), contradicting these findings. In this study, which does not attempt to find gender differences in online gambling severity, both men and women engage in online gambling, notably in universities, with easier and more extensive involvement. According to the perspectives of the participating university students, many of their friends gamble online. Thus, internet gambling is more likely to occur among youth (Griffiths & Barnes, 2008; Nowak & Aloe, 2014).

Nearly 23% of university students (9) said they bet daily online. The following shows that many university students bet online 2–3 days a week. Many university students gamble online 4–5 or 1–2 days a week. Interesting: 12.5% of research participants (5) said they would gamble if they had money. These data suggest some university students engage in problematic internet gambling. When asked about the length of time university students spend gambling online, 23% ($n = 9$) said they gambled for 1–2 hours a day, while 23% said it depends on the situation. They believe this variety is due to running out of betting money or winning a lot. Following these findings, several students reported gambling online for 3–4, 2–3, or 5–6 hours a day. Another study of Turkish teens found that 28% spend at least 107 minutes a day on gambling websites, and 8% spend more than 3 hours (Aricak, 2019). Another study by Dinc et al. (2020) found that everyday gaming leads to online gambling addiction. In this context, 23% of university students in the survey are at high risk of online gambling addiction due to its frequency and length. In addition, beyond these addiction risk and behavioural patterns, online gambling disorder not only impairs the individual's functioning but also puts the individual, family, and society at risk, with the individual engaging in numerous undesirables socially unacceptable behaviours in professional and social life and even taking part in illegal activities (Fong, 2005).

More than half of students did not specify a preferred technical gadget for online gaming. It was then found that smartphones and computers dominate online gambling. The students who spoke preferred smartphones for online gambling anytime and anywhere. Access to online gaming quickly allows habitual

gambling, which increases the risk of compulsive gambling addiction (Chóliz, 2016). Smartphones, which young people consider an extension of their body (Gezgin et al., 2019), can harm university students economically, physically, and psychosocially (Koc et al., 2023) if used improperly because they contain harmful apps like online gambling and make it easy to access them. Another sub-theme was that students gamble in student residences using laptops, which they prefer. This result, in parallel with the results in the literature on mobile gambling (James et al., 2017; Whelan et al., 2021), shows that young people in Turkey can access casino games in an easier and faster way and with a few taps on a mobile device. The study found that smartphones, which play online gambling easier for university students, may increase online gambling frequency. Moreover, the increasing frequency of online gambling on smartphones paves the way for young people to develop both smartphone and gambling addictions.

More than half of university students did not wish to indicate their preferences for online gambling websites or apps. One sub-theme is university students gambling on illicit websites. University students bet on legal sites, another viewpoint sub-theme. University students are reluctant to discuss this topic because roulette, slots, and casino games are illegal in Turkey and incur legal repercussions. Even if university students favor slots, illicit websites are nevertheless utilized for gambling more often. The rising popularity of internet gambling in Malaysia despite its illegality shows that unlawful sites are used worldwide (Rathakrishnan & George, 2021). A survey of Turkish teens found that 19.3% had VIP memberships on betting sites (Aricak, 2019). Turkey offers legal internet gambling, including government-sanctioned betting and İddaa, in addition to slots and casino games. However, some students favor illicit sites for their superior odds and diversity of bets. A study found that university students frequently utilize legal sites like nesine.com, which offers İddaa and sports betting under government control. According to these statistics, university students who favor unlawful online gambling sites face legal penalties due to Turkey's gaming legislation. Additionally, university students are subject to cyber fraud and illicit site attacks.

Slot machine simulation apps are the first sub-theme of university students favored online gambling sorts. University students also prefer sports betting. While less popular than slots and sports betting, casino games, blackjack, and betting games are also preferred. The gambling inclinations of teenagers and young adults were also studied. It showed that scratch cards, slot machine gambling, and lottery gambling grew while card, skill, and sports gambling decreased (Winters et al., 2002). Another study found that teens gambled on scratch cards, instant tickets, sports betting, skill games for money, lottery tickets, slot machines, and dice games in order of predominance (Petry & Gonzalez-Ibanez, 2015). Griffiths and Barnes (2008) found that sports bets were most popular, followed by poker, casino games, horse racing, the lottery, scratch cards, and slot machines. A Canadian study found that online poker (59.7%), lottery (23%), sports betting (16.7%), casinos (7.6%), horse racing (5.2%), and bingo (2.4%) were preferred. Badminton and football (especially the Premier League) are popular in Malaysia (Rathakrishnan & George, 2021). Teen patti, rummy, and poker—"games of skill"—are becoming popular online in India (Vijayakumar & Vijayakumar,

2023). A Turkish thesis indicated that university students chose the national lottery and internet betting (Siran, 2020). As seen in the literature, different investigations have varied outcomes. This may be due to participants' demographics, online gambling activity, and country-specific addiction levels. Even though their frequency varies, teens and young adults like sports betting and slot games. University students also preferred slots and sports betting in our survey. Slot games' minimal effort, lack of strategy, belief in larger rewards, and simplicity of play contribute to this. Finally, slot games' looks and noises may appeal to university students (Gainsbury, 2015), and their opinion that they resemble conventional games (Siran, 2020) may increase their popularity over time. Online gambling in Turkey is anticipated to grow, especially owing to e-slots. The expansion of e-slots choices and their addictive nature predict that they will become the most harmful type of gambling in the near future (Chóliz, 2023). On the other hand, it has been reported in the literature that pathological gamblers are more likely to bet on sports, which remains especially popular among university students (Caldeira et al., 2017), compared to other forms of gambling (Kessler et al., 2008). In other words, those who gamble on sports are exposed to a higher risk of experiencing gambling-related problems compared to participants engaging in other gambling activities (Kessler et al., 2008; Martin et al., 2010). However, the finding that sports betting ranked behind slot machines in terms of preference in this study may suggest a shifting trend. This shift underscores the rising appeal of slot games, potentially due to their simplicity, sensory engagement, and perceived resemblance to traditional games, marking a transformation in gambling preferences among university students.

University students' motivation for online gambling is primarily influenced by their peer groups. This finding aligns with Social Cognitive Theory (Bandura, 1986), which highlights the role of social influences, observational learning, and perceived self-efficacy in shaping behavior. Peer influence has been shown to play a crucial role in motivating social casino game players to gamble online, as evidenced by a Canadian study involving 21 participants (Kim et al., 2017). Similarly, Arıcak (2019) observed that Turkish teenagers often learn about internet gambling from their peers, relatives, siblings, and even parents. University students are increasingly using online gambling as a method of socialization and amusement (Bayindir, 2018). The study further reveals that university students often gamble with pooled money at cafés and student houses, as well as through online platforms. This underscores the risk that frequent peer influence and gambling as a tool for socialization may contribute to the growing prevalence of such behaviors within peer groups. Following this, many university students find online gambling intriguing, as it offers a combination of excitement, the potential for significant financial gain, and an accessible platform for entertainment and social interaction. Among the top motivations for online gambling are the desire to earn money quickly, the chance to achieve significant winnings, and the aspiration to make substantial financial gains. In addition, online gambling site signup bonuses have been identified as another key factor influencing gambling behaviors (Kim et al., 2017). Social media also plays a pivotal role, directly and indirectly promoting online gambling. Gambling advertisements on social media platforms, along with the desire to emulate celebrities, particularly among women, further encourage university

students to gamble online in pursuit of purchasing expensive clothing or makeup (Gainsbury et al., 2016). Global and domestic economic challenges, including inflation and rising consumer goods prices, have emerged as significant factors influencing gambling behaviors. In Turkey, these economic pressures affect key motivations for gambling, such as earning money, making easy money, and achieving financial stability. Many Turkish university students report that these challenges hinder their ability to maintain their desired lifestyle, leading them to perceive online gambling as a quick and simple solution to their financial struggles. Furthermore, the illegal status of casino games in Turkey has not deterred university students from engaging in online gambling activities, as peer influence and exposure to online gambling advertisements continue to shape their behaviors. The findings of a study conducted in Italy further underscore these dynamics. Between 2014 and 2017, traditional games such as scratch-offs, instant lotteries, lotto, and bingo were more popular among wealthier individuals. However, a shift in preferences has been observed, with less affluent individuals favoring newer generation games such as sports betting, slot machines, and Texas hold'em. This shift reflects the growing income inequality over time, contributing to the rising popularity of these "pro-poor" gambling activities (Resce et al., 2019). As these games represent the largest contributors to both the growth in gambling revenue and the prevalence of gambling disorders, the findings suggest that a disproportionate share of the social costs associated with gambling is borne by less affluent and potentially more vulnerable members of society. Ultimately, these findings reveal that university students engage in online gambling not only as a form of socialization but also as a means of addressing financial challenges and enhancing their quality of life. However, the intersection of peer influence, social media advertising, and economic hardship highlights the need for targeted interventions to mitigate the risks associated with these behaviors.

University students primarily highlighted the physical consequences associated with online gambling. Reported symptoms included jaw tremors, head tingling, sleep disturbances, hair pulling or loss, nightmares, emotional outbursts such as crying, increased smoking, difficulty concentrating, heightened cigarette and alcohol consumption, and a lack of physical activity. Beyond these physical effects, students expressed feelings of needing to conceal their gambling behaviors from their families, fear of being discovered, and difficulty coping with feelings of despair following financial losses. Despite these adverse effects, some students also reported moments of satisfaction and exhilaration when earning money through online gambling. These findings are consistent with the literature. Wong (2010) identified financial difficulties, sleep disruptions, physical health problems, declining academic performance, strained family relationships, and work-related issues as common consequences reported by internet gamblers, listed in decreasing order of prevalence. Similarly, Petry and Gonzalez-Ibanez (2015) found that online gamblers experienced increased school absenteeism, family conflicts, and heightened anxiety levels. McBride and Derevensky (2009) further noted that problem gamblers were more likely to use mobile phones for gambling, spend larger amounts of money, gamble under the influence of alcohol or drugs, and experience greater financial losses online. Collectively, the literature and the current study underscore the multifaceted risks associated with online

gambling for university students, including physical, psychological, social, and familial harms.

Nowadays, online gambling among university students is growing alarmingly. Online gambling's addiction and high losses raise this concern (McCormack & Griffiths, 2012). Online gambling, especially when it becomes compulsive, endangers young people's lives, health, and mental well-being (Koivula et al., 2022). Due to their structural vulnerabilities, young people in Turkey, like the rest of the world, are at risk of gambling, especially online gambling, which has become more accessible, affordable, anonymous, and convenient due to technology (Hubert & Griffiths, 2018). Due to technology, internet gambling threatens Turkish youth just as much as anywhere else.

The findings of this study reveal that economic challenges significantly influence Turkish university students' motivations for online gambling. Key motives include the desire to earn money quickly, the aspiration for financial stability, and the opportunity for substantial financial gains. These motivations are shaped by broader economic difficulties, such as inflation and rising consumer goods prices, which hinder students' ability to maintain their desired lifestyle. Consequently, online gambling emerges as a perceived quick and simple solution to these financial struggles. In addition to economic factors, socialization and peer influence play a critical role in shaping students' online gambling behaviors. University students often gamble as a means of connecting with peers, with social pressure and encouragement from friends further reinforcing these behaviors. Male students, in particular, are more likely to engage in online gambling than their female students, reflecting gender-based differences in gambling tendencies. Among the types of games preferred, students reported a strong inclination toward slot machines, sports betting (such as "İddaa"), and online casino games, which provide both a sense of thrill and the prospect of substantial financial rewards. The study also highlights the social, psychological, and physical repercussions of online gambling among university students. Participants reported issues such as sleeplessness, heightened anxiety, strained family relationships, and a compulsion to hide their gambling behavior from others. Despite these adverse effects, students also acknowledged feelings of exhilaration and satisfaction when earning money through online gambling, reflecting its dual nature as both a source of harm and a temporary reward. These findings underscore the growing threat of online gambling, which, due to its accessibility, anonymity, and convenience facilitated by technology, poses significant risks to young people worldwide, including in Turkey (Hubert & Griffiths, 2018). The results also fill a critical gap in the literature by providing evidence of the intersection between economic vulnerability, peer influence, socialization, and online gambling behaviors in the Turkish context, an area that remains underexplored.

Practical implications of this research suggest that universities have a vital role in combating the rise of online gambling among students. Institutions should incorporate addiction education into their curricula to raise awareness of the risks associated with gambling and online betting (Akca, 2019). Additionally, enhancing university sports and social facilities to align with students' interests can promote healthier leisure activities and reduce the appeal of online gambling as a form of entertainment. Moreover,

universities should provide greater economic support to students to address the financial pressures that often drive them toward gambling. Initiatives such as increasing the availability of scholarships, offering financial aid, and creating opportunities for part-time work under fair conditions can help students manage their economic challenges more effectively (Adu-Akoh & Kwarteng-Nantwi, 2023). By addressing the root causes of financial stress, these measures can reduce the reliance on gambling as a perceived solution to monetary difficulties, thereby contributing to a healthier and more balanced student. Establishing Addiction Research Centers within universities is also imperative. These centers can provide psychological support to students, enabling the early identification of problematic gambling behaviors and offering targeted interventions, such as group and individual therapy (Siran, 2020). Such measures can mitigate the progression of gambling-related pathologies and foster a supportive environment for affected students. To further advance the field, future research should include longitudinal studies with larger and more diverse samples to track pathological and social gambling patterns over time. This approach will provide a deeper understanding of the dynamics of online gambling, particularly the role of peer influence, socialization, economic problems, and gender differences, and inform the development of effective prevention and intervention strategies (National Research Council, 1999).

Limitations

Two components of the study are limited. First, discovering and enlisting research volunteers is tough. Apart from government-regulated internet gambling (sports betting, lottery, etc.), casinos and slots are illegal and punishable in Turkey. Some university students did not participate in the survey owing to security concerns since they gambled online on unlawful websites or apps. The second restriction is the study's self-reported character. Thus, student-opinion-based research raises questions about its validity.

Data Availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethics Committee Approval: Ethics committee approval was received from Trakya University Social and Human Sciences Research Ethics Committee for the study (Session No: 2022/03, Decision No: 2022.03.14 and, Decision Date: 23.03.2022).

Informed Consent: Written informed consent was obtained from the participants who agreed to take part in the study.

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