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Original Article

Determinants of Preventive Behaviors Against Alcohol Consumption Among University Students: An Application of the Theory of Planned Behavior

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Abstract

Introduction: Despite legal prohibitions and prevailing cultural norms, research evidence shows an increasing trend in alcohol consumption among Iranian youth and university students. The present study aimed to assess preventive behaviors related to alcohol consumption among students of the School of Paramedical Sciences and Public Health at a university in Mashhad, based on the Theory of Planned Behavior (TPB).

Methods: This descriptive-analytical cross-sectional study was conducted in 2024 on 422 students selected through convenience sampling. Data were collected using a demographic questionnaire and a researcher-developed instrument based on TPB constructs. with previously established validity and reliability. Data analysis was performed in SPSS version 27.

Results: The mean preventive behavior score related to alcohol consumption was 17.12 ± 3.54 out of 20. Significant associations were observed between preventive behaviors and demographic variables such as gender, field of study, marital status, place of residence, mother's education level, and mother's occupation ($P<0.05$). All TPB constructs including attitude ($r=0.560$), subjective norms ($r=0.514$), perceived behavioral control ($r=0.360$), and behavioral intention ($r=0.610$) showed significant positive correlations with preventive behaviors ($P<0.001$).

Conclusion: The Theory of Planned Behavior plays a significant role in predicting and explaining preventive behaviors related to alcohol consumption among university students. The strong associations between TPB constructs and preventive behaviors underscore the importance of addressing attitudes, social norms, perceived behavioral control, and particularly behavioral intention when designing educational and preventive interventions.

Introduction

Alcohol is a psychoactive and addictive substance and remains a major public health concern worldwide.[1] According to the World Health Organization's 2019 report, harmful use of alcohol is responsible for approximately 3 million deaths annually, accounting for 5.3% of all global deaths. Moreover, alcohol consumption contributes to 5.1% of the global burden of disease and injury, equaling 132.6 million years of healthy life lost (DALYs). The global average per capita alcohol consumption among individuals aged 15 and older is estimated at 6.4 liters per year, with a general prevalence rate of around 43%.[2]

Despite legal prohibitions and strong cultural norms in Iran, recent evidence suggests a growing trend of alcohol consumption among youth and university students.[3,4] A study conducted during the 2017–2018 academic year on 450 students from various universities in Urmia reported an alcohol use prevalence of 15.82%.[5] Additionally, a 2019 systematic review and meta-analysis of Iranian studies estimated that about 15% of young people had consumed alcohol.[6] Another study in 2022 among students at Bojnourd University of Medical Sciences found that 7% had consumed alcohol within the past year.[7] These findings indicate that, despite legal and religious restrictions, alcohol consumption is relatively prevalent among Iranian youth.[6]

In addition to its addictive properties, alcohol has extensive negative effects on individual and public health. It is widely regarded as a chronic, progressive, and potentially fatal disease.[8] Recent studies show that alcohol's net health impact is entirely negative and that the only safe level of

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consumption is none at all.[9] Alcohol use can harm multiple systems in the body, leading to liver conditions such as fatty liver and cirrhosis, cardiovascular disorders, neurological damage, cognitive impairments, several types of cancer, infections, hormonal imbalances, diabetes, and diseases of the bones, kidneys, blood, and muscles[2,10,11] From a psychological perspective, alcohol use can cause mental health disorders, addiction, depression, anxiety, and specific syndromes like Wernicke–Korsakoff.[12] It may also impair students' academic performance.[13] Nevertheless, in some subcultures, drinking alcohol is viewed as a symbol of modernity and social prestige, particularly among youth and students.[14,15]

Globally, preventing alcohol use remains a critical priority in public health agendas.[16] Identifying the factors that influence preventive behaviors—especially among young adults—is therefore essential.[17] In this context, behavioral health theories offer a valuable framework for understanding and promoting such behaviors.[18] One of the most widely applied models is the Theory of Planned Behavior (TPB), introduced by Ajzen in 1991, which is frequently used to analyze health-related and substance use behaviors, including alcohol consumption.[19,20] According to this theory, the strongest predictor of behavior is behavioral intention, which is influenced by three main constructs: attitude toward the behavior, subjective norms, and perceived behavioral control.[19] Numerous international studies have confirmed the effectiveness of this model in predicting alcohol-related preventive behaviors among university students.[21]

Given the rising prevalence of alcohol consumption among students, the importance of preventive interventions in this population, and the limited number of Iranian studies applying the TPB to alcohol use—most domestic research has focused instead on behaviors such as risky sexual activity[22], cigarette smoking[23], and drug use[24] this study aimed to examine preventive behaviors related to alcohol consumption among students of the School of Paramedical Sciences and Public Health at Islamic Azad University of Mashhad, based on the Theory of Planned Behavior.

Methods

Study Design

This research was a descriptive-analytical cross-sectional study conducted in 2024 (1403 in the Iranian calendar).

Sample Size and Sampling Method

The study population consisted of students from the School of Allied Medical Sciences and the School of Public Health at Islamic Azad University, Mashhad Branch. The minimum required sample size was initially estimated to be 332 participants based on a previous study by Hamidian Rad et al.[25], which reported an alcohol consumption prevalence of 15.82%, with a 5%Type I error and 4% precision, using the following formula:

$$n = \frac{z^2_{1-\alpha/2} \times p(1-p)}{d^2}$$

However, due to the lack of similar studies in Mashhad, a conservative prevalence of 50% was assumed. Accordingly, the required sample size was calculated to be 386. Accounting for a 20% potential dropout rate, the final sample size was set at 420 participants.

A convenience sampling method was employed. Following the approval of the study by the Vice-Chancellor for Research at Mashhad University of Medical Sciences and obtaining the necessary permissions, initial coordination was made with the heads of the relevant faculties. The researcher then attended classrooms in person, explained the study's objectives, and invited eligible and willing students to participate. Of the students approached, 429 completed the questionnaire. After excluding 7 incomplete responses, data from 422 participants were included in the final analysis. The self-administered questionnaires were completed in-class within approximately 30 minutes, with the assistance of faculty officials and the presence of the researcher.

Inclusion criteria included Iranian nationality, willingness to participate, and current enrollment in one of the two relevant faculties at Islamic Azad University, Mashhad. The exclusion criterion was failure to complete the questionnaire.

Data Collection Tools

Two instruments were used for data collection. Demographic Questionnaire: This section gathered demographic and background information including age, gender, field and year of study, marital status, place of residence, parents' education and occupation, family income, personal alcohol use, alcohol use among relatives, having friends who consume alcohol, and history of emotional or psychological problems.

TPB-Based Preventive Behavior Questionnaire: To assess preventive behaviors regarding alcohol use, a researcher-made instrument based on the Theory of Planned Behavior (TPB) was utilized. The questionnaire was developed based on Ajzen's TPB framework, relevant literature, and previously published TPB-based instruments related to health behaviors and substance use. An initial pool of items was generated to reflect the conceptual domains of the TPB constructs. Specifically, attitude items were designed to assess students' beliefs and evaluations regarding avoidance of alcohol consumption; subjective norm items examined perceived social expectations and pressures from important referents such as family members and peers; perceived behavioral control items assessed students' perceived ability and confidence to avoid alcohol use in different situations; behavioral intention items measured readiness and willingness to engage in preventive behaviors; and preventive behavior items assessed actual self-reported behaviors related to avoiding alcohol consumption. The wording of the items was refined to ensure clarity, simplicity, and cultural appropriateness for Iranian university students. To ensure face and content validity, the initial version was reviewed by 12 experts in health education and health promotion, and their feedback was

incorporated. Quantitative content validity was assessed using the Content Validity Ratio (CVR) and Content Validity Index (CVI), which were found to be 0.81 and 0.97, respectively — indicating strong content validity.

To assess reliability, the questionnaire was administered to 20 individuals from the target population (excluding those in the main study), and re-administered after 10 days. Test–retest reliability was evaluated using Intraclass Correlation Coefficient (ICC), and internal consistency was assessed using Cronbach's alpha. ICC values were as follows: attitude (0.94), subjective norms (0.90), perceived behavioral control (0.79), behavioral intention (0.89), and preventive behavior (0.87). Cronbach's alpha values were: attitude (0.82), subjective norms (0.72), perceived behavioral control (0.70), behavioral intention (0.72), and preventive behavior (0.75) — all indicating satisfactory reliability.

The final questionnaire consisted of 23 items covering the five TPB constructs: Attitude (8 items, score range: 8–40): Focused on negative attitudes toward alcohol consumption; higher scores indicated more negative attitudes. Subjective Norms (4 items, score range: 4–20): Measured the influence of social norms promoting alcohol avoidance. Perceived Behavioral Control (4 items, score range: 4–20): Assessed perceived control over avoiding alcohol use; higher scores reflected stronger self-control. Behavioral Intention (3 items, score range: 3–15): Evaluated intentions to adopt preventive behaviors; higher scores indicated stronger intentions. Preventive Behavior (4 items, score range: 4–20): Assessed actual preventive behaviors regarding alcohol consumption. Items related to attitude, subjective norms, perceived behavioral control, and intention were rated on a 5-point Likert scale from "Strongly disagree" (1) to "Strongly agree" (5). Reverse-coded items were scored accordingly. Preventive behaviors were rated on a 5-point frequency scale from "Never" (1) to "Always" (5).

Data Analysis

Quantitative variables were described using means and standard deviations, while categorical variables were reported as frequencies and percentages. The normality of quantitative data was evaluated using the Kolmogorov–Smirnov test. Since several variables did not meet the normality assumption, non-parametric tests were applied accordingly. To analyze relationships between variables, Mann–Whitney U, Kruskal–Wallis, and correlation tests were used. All analyses were performed using SPSS version 27, with a significance level set at $P < 0.05$.

Results

A total of 422 questionnaires were completed and analyzed by students from the School of Paramedical Sciences and Public Health at Islamic Azad University of Mashhad. According to the findings in Table 1, the majority of participants were female students. In terms of academic major, laboratory sciences students made up the largest proportion. Most of the participants' parents had educational levels above a high school diploma. Regarding

Table 1. Demographic characteristics of the study participants

Variable	Category	Number	Percentage
Gender	Female	327	77.5
	Male	95	22.5
Field of Study	Public Health	72	17.1
	Laboratory Sciences	164	38.9
	Radiology	32	7.6
	Surgical Technology	76	18
	Anesthesiology	78	18.5
Semester	Lower semesters (1st to 4th)	277	65.6
	Upper semesters (5th to 8th)	145	34.4
Marital status	Single	392	92.9
	Married	30	7.1
Residence status	Living with parents	337	79.9
	Dormitory	47	11.1
	Living alone/with friends	26	6.2
	Living with spouse	12	2.8
Father's education level	Below high school diploma	58	13.7
	High school diploma	122	28.9
	Above high school diploma	242	57.3
Mother's education level	Below high school diploma	60	14.2
	High school diploma	152	36
	Above high school diploma	210	49.8
Father's occupation	Worker	15	3.6
	Employee	118	28
	Self-employed	203	48.1
	Retired	80	18.9
	Deceased	6	1.4
Mother's occupation	Housewife	304	72
	Employed	95	22.5
	Retired	23	5.5
Perceived family economic status	Low	18	4.3
	Moderate	276	65.4
	High	128	30.3
Alcohol use status	User	73	17.3
	Non-user	349	82.7
Alcohol use among relatives	Close relatives	12	2.9
	Distant relatives	16	3.9
	Both close and distant relatives	7	1.7
	No relatives consume alcohol	373	91.4
Alcohol use among close friends	Yes	134	31.8
	No	288	68.2
Mental health history	Yes	86	20.4
	No	336	79.6
Variable	**Mean ± SD**	**Minimum**	**Maximum**
Age	20.56 ± 1.87	18	33
Age at first alcohol use (among alcohol users only)	18.22 ± 2.13	13	24

occupation, self-employment was the most common among fathers, while homemaking was most common among mothers. Additionally, most participants reported a moderate economic status.

In terms of alcohol consumption patterns, the majority of participants were non-users of alcohol and reported no history of alcohol use among their close relatives or friends. However, a percentage of participants reported either personal use or exposure to alcohol use in their social circles. Some individuals also reported a history of psychological or emotional issues.

Based on the results presented in Table 2, the demographic variables were categorized into two groups: those showing significant associations with preventive behavior scores and those without significant relationships. Among the variables with significant associations, female students had higher preventive behavior scores compared to males ($P<0.001$). Students majoring in public health and surgical technology also demonstrated significantly higher scores than those in other fields ($P<0.001$). Married participants showed higher levels of preventive behavior than single students ($P=0.012$). Place of residence was significantly related to preventive behavior, with students living with their parents or spouse scoring higher than those living alone or with friends ($P=0.002$). Mother's education was associated with preventive behavior scores, with the highest mean scores observed among students whose mothers held a high school diploma ($P=0.026$). Mother's occupation similarly showed a significant relationship; students whose mothers were homemakers demonstrated higher preventive behavior ($P=0.026$). Alcohol use among relatives and close friends was also significantly associated with preventive behavior scores, with students reporting no alcohol use in their social circles achieving higher preventive scores ($P<0.001$). Additionally, a positive and significant correlation was found between age at alcohol use initiation and preventive behavior scores ($P=0.043$), indicating that a later initiation age was associated with better preventive behavior. In contrast, the remaining demographic variables included in Table 2 did not show statistically significant associations with preventive behavior scores.

Table 3 presents the frequency distribution of scores related to the Theory of Planned Behavior (TPB) constructs and alcohol-related preventive behaviors. The results

Table 2. Relationship Between Significant Demographic Variables and Alcohol-Related Preventive Behaviors

Variable	Category	Preventive behaviors score (mean ± sd)	*P* value	Statistic
Gender	Female	17.49 ± 3.20	<0.001$	3.562
	Male	15.83 ± 4.31		
Field of Study	Public Health	18.04 ± 2.83	<0.001*	17.969
	Laboratory Sciences	16.21 ± 4.03		
	Radiology	16.44 ± 3.80		
	Surgical Technology	18.18 ± 2.20		
	Anesthesiology	17.41 ± 3.51		
Marital status	Single	17.01 ± 3.59	0.012$	2.517
	Married	18.50 ± 2.58		
Residence status	Living with parents	17.24 ± 3.46	0.002*	15.247
	Dormitory	17.53 ± 2.78		
	Living alone/with friends	14.23 ± 4.71		
	Living with spouse	18.25 ± 2.92		
Mother's education level	Below high school diploma	17.43 ± 3.61	0.026*	7.296
	High school diploma	17.68 ± 2.91		
	Above high school diploma	16.62 ± 3.87		
Mother's occupation	Housewife	17.26 ± 3.57	0.047*	6.112
	Employed	16.54 ± 3.50		
	Retired	17.48 ± 3.21		
Alcohol use status	User	12.88 ± 3.46	<0.001$	10.545
	Non-user	18.00 ± 2.85		
Relatives' alcohol consumption status	Close relatives	13.67 ± 3.02	<0.001*	26.670
	Distant relatives	17.00 ± 2.78		
	Both close and distant relatives	12.86 ± 2.79		
	No relatives consume alcohol	17.44 ± 3.43		
Close friends' alcohol use	Yes	15.04 ± 3.88	<0.001$	8.979
	No	18.08 ± 2.92		
Age at first alcohol use (years)		-	0.043 ϑ	0.238cc

$Mann-Whitney U test, *Kruskal–Wallis H test, ϑSpearman test, ccCorrelation Coefficient

indicate that participants scored highest in the constructs of attitude and perceived behavioral control, while the lowest scores were observed in behavioral intention and subjective norms. The mean preventive behavior score across all participants was 17.12 (SD = 3.54) out of a maximum score of 20, indicating that participants achieved approximately 85.6% of the total possible score.

As shown in Table 4, there were statistically significant and positive correlations between all TPB constructs and alcohol-related preventive behaviors ($P < 0.001$). The strongest correlation was observed between behavioral intention and preventive behaviors, followed by attitude, subjective norms, and perceived behavioral control.

Discussion

This study investigated preventive behaviors related to alcohol consumption among students at the Faculty of Paramedicine and Health, Islamic Azad University of Mashhad, using the Theory of Planned Behavior (TPB). Findings revealed statistically significant relationships between preventive behaviors and the core TPB constructs: attitude, subjective norms, perceived behavioral control, and behavioral intention. Consistent with previous research[26,27], behavioral intention emerged as the strongest predictor of preventive behaviors, underscoring its critical role in shaping these actions.

Our findings on the significant associations between behavioral intention and other TPB constructs, including attitude, subjective norms, and perceived behavioral control, are consistent with the descriptive study by Tavakoli Ghoochani et al.[24] Their research among students at North Khorasan University of Medical Sciences also identified attitude toward substance use as a key predictor of behavioral intention, underscoring the critical role of personal attitudes in shaping intentions and subsequent behaviors.

In the present study, 17.3% of students reported alcohol use, with a mean age of initiation at 18.22 ± 2.13 years. These findings align with Mozaffari-Nia et al.[28], who reported a lifetime prevalence of 19.9% and an average initiation age of 18.6 years among students at Tehran University of Medical Sciences. However, the slightly lower prevalence in our study may be attributed to cultural and religious differences between Mashhad and Tehran, as well as variations in data collection methods and participant honesty. These contextual differences highlight the need to tailor preventive programs to specific cultural and social environments.

The findings also showed that female students reported significantly higher mean scores in preventive behaviors compared to males. This aligns with previous research indicating women's greater engagement in protective behaviors[29] and lower rates of alcohol consumption and related disorders compared to men.[30] While the gender gap in alcohol consumption is narrowing, women remain biologically more sensitive to alcohol's harmful effects and face a greater risk of severe health consequences.[31]

This study also found that married individuals demonstrated more preventive behavior against alcohol use, consistent with findings that married couples generally consume less alcohol and exhibit lower rates of alcohol use disorder, attributed to social control norms and mutual monitoring within marital relationships.[32] Furthermore, students living with their parents or spouse displayed more preventive behaviors compared to those living alone or with peers, as single individuals or those living with peers are more frequently exposed to environments where alcohol consumption is normalized or encouraged.[33,34]

The study also found that students whose mothers were homemakers exhibited better preventive behavior toward alcohol consumption, consistent with Mobasheri et al.[27]Their research also reported a positive impact of having a homemaker mother on reducing alcohol use intention and behavior, potentially due to increased time for monitoring and establishing strong emotional connections, which significantly contributes to reducing high-risk behaviors.[35-37]

Alcohol consumption by close and distant relatives was significantly associated with students' preventive behavior scores; students whose relatives did not consume alcohol reported the highest preventive behavior scores, while those with drinking relatives had the lowest. This finding highlights the negative impact of familial alcohol use patterns, consistent with research showing individuals who lived with alcohol-using relatives in childhood are more likely to consume alcohol in adulthood[38] and that parental alcohol use is associated with earlier and more intense consumption in children.[39]Furthermore, students whose close friends did not consume alcohol reported higher preventive behavior scores. This aligns with findings that peer alcohol use is significantly associated with students' inclination to drink,[40]underscoring the critical role of subjective norms and family role models in shaping

Table 3. Mean, SD, and Score Range of TPB Constructs and Alcohol-Related Preventive Behaviors

Variable	Mean ± SD	Minimum	Maximum
Attitude	29.49 ± 5.82	12	40
Subjective Norms	15.40 ± 3.02	6	20
Perceived Behavioral Control	17.20 ± 3.00	6	20
Behavioral Intention	11.29 ± 2.70	3	15
Preventive Behaviors	17.12 ± 3.54	4	20

Table 4. Correlation Results between TPB Constructs and Alcohol-Related Preventive Behaviors

Variable	Preventive Behaviors	
	Correlation Coefficient Spearman	*P* value
Attitude	0.560	<0.001
Subjective Norms	0.514	<0.001
Perceived Behavioral Control	0.360	<0.001
Behavioral Intention	0.610	<0.001

preventive behaviors.

Limitations

This study has several limitations that should be taken into account when interpreting the findings. First, the use of self-reported questionnaires may have introduced response bias, particularly social desirability bias, given the sensitive and culturally restricted nature of alcohol consumption in Iran. Participants may have underreported alcohol-related behaviors or provided answers they perceived as socially acceptable. Second, due to practical and administrative constraints, convenience sampling was employed, and probability-based sampling methods could not be implemented. This limitation, along with the fact that the sample was drawn exclusively from students in the School of Paramedical Sciences and Health at Mashhad Azad University, restricts the external validity and generalizability of the findings to broader university student populations.

Additionally, the sample predominantly consisted of female students (77.5%), which introduces a potential gender-related bias and may limit the applicability of the results to male students or groups with a more balanced gender distribution. Moreover, the cross-sectional design of the study prevents causal inference and does not allow for examining behavioral changes over time or evaluating the long-term impact of preventive factors. Finally, several important cultural, social, and psychological determinants of alcohol consumption—such as religious beliefs, family expectations, peer dynamics, and media influences—were not assessed and could be explored in future research. In light of these limitations, future research should expand the sampling frame to include multiple universities and diverse demographic groups, and, where feasible, employ probability-based or stratified sampling methods to improve representativeness and achieve a more balanced gender distribution. Incorporating mixed-method approaches, such as in-depth interviews and focus group discussions, may provide deeper insights into the factors influencing preventive behaviors. Additionally, designing and implementing educational interventions grounded in the Theory of Planned Behavior—focusing on strengthening positive attitudes, modifying subjective norms, and enhancing perceived behavioral control—may help reduce high-risk behaviors. Programs addressing the role of family and peers, including peer-pressure resistance training, are also recommended. Lastly, longitudinal studies are encouraged to examine behavioral changes over time and to evaluate the long-term effectiveness of preventive interventions.

Conclusion

The findings of this study revealed that despite legal prohibitions and cultural restrictions, alcohol consumption exists among a portion of students at the School of Paramedical Sciences and Health, Mashhad Azad University. The study also demonstrated that preventive behaviors against alcohol consumption are associated with certain demographic characteristics, including gender, field of study, marital status, and living conditions. Notably, female students, married individuals, and those living with their parents scored higher on preventive behaviors. According to the Theory of Planned Behavior (TPB), preventive behaviors were significantly correlated with negative attitudes toward alcohol consumption, supportive subjective norms for prevention, high perceived behavioral control, and a strong intention not to consume alcohol. These findings confirm that TPB provides a suitable framework for designing educational and behavior change interventions in this context.

Therefore, given the effectiveness of TPB components in explaining preventive behaviors related to alcohol use, it is recommended that university educational programs focus on enhancing negative attitudes toward alcohol consumption, strengthening social norms that support abstinence, and increasing students' self-efficacy to resist social pressures. Such interventions could play a crucial role in reducing the inclination to consume alcohol among students and contribute to the improvement of their physical, psychological, and social health.

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Competing Interests

The authors declare that they have no competing interests.

Ethical Approval

This study was conducted with the approval of the Ethics Committee for Human Research at Mashhad University of Medical Sciences (Code: IR.MUMS.FHMPM.REC.1403.170) and in accordance with the ethical principles of the Declaration of Helsinki. All participants were informed about the objectives of the study and provided informed verbal consent prior to participation. They were assured that their responses would remain confidential, and each participant was assigned a unique code to protect their identity.

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