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Unhealthy drinking and health beliefs: The moderating role of demographics in a Philippine university context

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Abstract Unhealthy alcohol consumption among university students is a significant public health issue. While established frameworks like the Health Belief Model (HBM) can explain the cognitive drivers of this behavior, the influence of demographic factors as moderators is less understood. This study aimed to identify the primary HBM predictors of unhealthy drinking among students in the Philippines and to investigate the moderating effects of age, sex, and monthly family income on the belief-behavior relationships. A quantitative, descriptive-correlational design was employed with a sample of 374 university students (85.8% male). Data were collected using a validated survey instrument measuring HBM constructs (Perceived Threat, Benefits, Barriers, Self-Efficacy, Cues to Action), unhealthy drinking habits, and demographic variables. Statistical analysis involved Pearson correlation, multiple linear regression, and moderation analysis. The results indicated that four of the five HBM constructs were significant positive predictors of unhealthy drinking, with Perceived Barriers (β = .31) and Cues to Action (β = .29) emerging as the most influential. Perceived Threat was not a significant predictor. The moderation analysis revealed that sex significantly moderated the relationship for all five HBM constructs, while age moderated the effects of Self-Efficacy and Cues to Action. Monthly family income showed no significant moderating effects. The findings underscore that the psychological drivers of student drinking are highly contextual and demographically dependent. Interventions should move beyond risk-based messaging and instead focus on developing targeted, skill-based strategies to help students navigate social barriers and environmental cues. Tailoring programs by sex and age is crucial for enhancing their effectiveness, though the gender disparity in the sample warrants further investigation in future studies.

Keywords: health belief model, alcohol consumption, university students, health behavior, moderation analysis moderation

1. Introduction

Unhealthy alcohol consumption among university students is a pervasive public health issue with significant global implications (Ay et al., 2025; Kejriwal, 2025). This demographic is particularly vulnerable to binge drinking and other high-risk behaviors, which are associated with a range of adverse outcomes, including diminished academic performance, mental health challenges, and long-term health complications (Bonsu, 2024; Ranker & Lipson, 2022). From a multidisciplinary perspective, this phenomenon is not merely a health concern but also a complex social and psychological issue, influenced by the unique pressures of transitioning to adulthood, academic stress, and increased social independence (Crisafulli et al., 2024; Rodríguez-Sáez et al., 2025). Understanding the underlying drivers of these behaviors is therefore critical for developing effective, evidence-based interventions (Mejía-Trujillo et al., 2025).

To explain and predict health-related behaviors, researchers often turn to established theoretical frameworks. The Health Belief Model (HBM) is one such prominent framework, positing that an individual's engagement in a health-related action is determined by a specific set of core beliefs (De Leon et al., 2023). By focusing on these psychological constructs, the HBM provides a structured lens through which to analyze the determinants of unhealthy drinking, moving beyond simple description to a more nuanced examination of student decision-making processes (Pearson, 2013).

While the HBM has been widely applied to various health behaviors, a significant gap remains in understanding how its predictive power varies across different demographic subgroups (Limbu et al., 2022). The relationships between health beliefs and actions are not always uniform; they can be strengthened, weakened, or altered by factors such as age, sex, and socioeconomic status (Niazi & Hussain, 2025). For instance, the social pressures and triggers (cues to action) related to alcohol consumption may differ substantially between male and female students, or the perceived barriers may be more pronounced for students from lower-income households (Walsh et al., 2023). Investigating these demographic factors not as direct predictors, but as moderators, is essential for tailoring interventions that are effective for specific, vulnerable populations

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(Alcantara et al., 2020). This is particularly relevant in the context of the Philippines, where cultural and socioeconomic factors may uniquely shape student health beliefs and behaviors (Hechanova et al., 2025).

Accordingly, this study provides a comprehensive analysis of the factors influencing unhealthy drinking habits among students at North Eastern Mindanao State University. By applying the Health Belief Model, this research first identifies which psychological constructs serve as the most significant predictors of unhealthy drinking within this population. Moving beyond direct prediction, the study then investigates the crucial moderating role of demographic characteristics. Specifically, it examines how age, sex, and monthly family income alter the strength and nature of the relationship between students' health beliefs and their drinking behaviors, thereby addressing a critical gap in the literature and providing a more nuanced understanding of this complex health issue.

2. Literature Review

2.1. The Context and Prevalence of Unhealthy Drinking in University Students

The transition to university life represents a critical developmental period marked by increased autonomy, academic pressures, and new social environments (Affan et al., 2025). This period is often associated with a higher prevalence of risky behaviors, with unhealthy alcohol consumption being one of the most significant public health concerns on campuses worldwide (Tebyanian et al., 2025). Research consistently demonstrates that university students, particularly those in their late teens and early twenties, report higher rates of binge drinking and alcohol-related harm compared to their non-student peers (Slutske, 2005). This demographic's drinking patterns are influenced by a confluence of factors, including the desire for social acceptance, coping with stress, and the widespread availability of alcohol in university settings (Crisafulli et al., 2025). Furthermore, the demographic composition of student populations is a key consideration. Studies have often highlighted that male tend to report higher frequency and quantity of alcohol consumption, suggesting that sex plays a fundamental role in shaping drinking norms and behaviors (Yi et al., 2017). Similarly, students from lower socioeconomic backgrounds may face unique stressors that influence their health choices, making demographic analysis an essential first step in understanding the scope of the problem (Puddephatt et al., 2024).

2.2. The Health Belief Model as a Framework for Understanding Drinking Behaviors

To move beyond a purely descriptive understanding of student drinking, it is essential to apply theoretical frameworks that can explain the underlying psychological mechanisms. The Health Belief Model (HBM) is a widely utilized model in health psychology that provides a robust structure for this purpose (Alyafei & Easton-Carr, 2025; Carpenter, 2010). The HBM posits that an individual's readiness to take a health-related action is a function of their subjective evaluations of a health threat and the perceived effectiveness of a recommended behavior (Orji et al., 2012; Shojaei et al., 2016). The model's core constructs—perceived threat, perceived benefits, perceived barriers, self-efficacy, and cues to action—have been individually and collectively correlated with a wide range of behaviors, including substance use (Muslim et al., 2025; Yu et al., 2020). A positive correlation between these constructs and an unhealthy behavior, such as excessive drinking, suggests that students' beliefs and perceptions are directly related to their actions, providing a foundation for predictive analysis (De Leon et al., 2023).

2.3. Predictive Utility of HBM Constructs on Alcohol Consumption

While the HBM provides a comprehensive set of predictors, the relative importance of each construct can vary depending on the behavior and the population being studied (Zewdie et al., 2025). Perceived barriers have emerged as a particularly strong predictor in substance use literature (Yu et al., 2025). For students, barriers to reducing alcohol intake may include social pressure, the belief that drinking is essential for socializing, or using alcohol as a primary coping mechanism for stress (Bryl et al., 2020). Perceived benefits, such as anticipated social lubrication, stress reduction, and enhanced mood, often powerfully predict higher alcohol consumption, as the immediate rewards are seen to outweigh potential risks (Halim et al., 2012).

Cues to action are also highly relevant in a university environment, which is often saturated with triggers such as social events, peer behavior, and campus traditions centered around alcohol (Borsari & Carey, 2001). Greater exposure to such cues is logically linked to more frequent and intense drinking episodes (Lorant et al., 2013). Self-efficacy, or an individual's confidence in their ability to refuse a drink or moderate their consumption, is another critical factor; lower self-efficacy is consistently associated with higher levels of unhealthy drinking (Tabernero et al., 2013). Interestingly, the role of perceived threat (encompassing perceived susceptibility to and severity of alcohol-related harm) has yielded mixed results (Wild et al., 2001). For young adults, a sense of invincibility or the discounting of long-term health consequences can render perceived threats a less potent predictor of behavior compared to more immediate social barriers and benefits (Goldberg et al., 2013). This highlights the need to identify which specific HBM constructs hold the most predictive power in a given context.

2.4. The Moderating Role of Demographic Factors in the HBM-Drinking Relationship

A critical gap in the existing literature lies not in determining whether the HBM predicts drinking, but for whom and under what conditions. The influence of health beliefs on behavior is rarely universal and is often moderated by demographic characteristics (Limbu et al., 2022). This study selected sex, age, and family income as potential moderators based on their theoretical relevance to the social and developmental context of university drinking.

Sex is a critical moderator because social norms, expectations, and physiological responses to alcohol often differ by gender (Erol & Karpyak, 2015). We hypothesize that these differences shape how HBM constructs relate to drinking. For instance, if alcohol consumption is closely tied to masculine identity, Perceived Benefits (e.g., social acceptance) may be a much stronger predictor of drinking for men (MacCalman et al., 2020). Conversely, women may perceive greater health and safety risks, making Perceived Threat a more salient predictor of their behavior. Men might also face unique social Perceived Barriers to moderating their drinking (e.g., fear of seeming weak), while Cues to Action might be more gendered, with men being more exposed to peer groups where heavy drinking is the norm.

Age serves as a proxy for developmental maturity, social experience, and progression through university life. Its moderating role is theoretically significant across several HBM constructs. For younger, first-year students, the influence of peer-related Cues to Action is likely to be at its peak as they navigate new social networks (DiGuiseppi et al., 2018). Their Perceived Threat from long-term health harms may also be lower due to a sense of invincibility common in late adolescence (Goldberg et al., 2013). Conversely, older students may have developed greater Self-Efficacy in their ability to refuse drinks and may perceive fewer Barriers to socializing without alcohol, potentially weakening the link between these constructs and consumption as they mature.

Finally, while socioeconomic status (measured here as family income) has shown mixed results as a moderator in previous studies, it remains theoretically relevant (Ay et al., 2025). We included it to explore how economic context might shape the belief-behavior link. For instance, students from lower-income households might experience higher levels of stress, potentially strengthening the relationship between Perceived Benefits (i.e., using alcohol for stress relief) and unhealthy drinking (Puddephatt et al., 2024). Alternatively, the financial cost of alcohol could act as a significant Perceived Barrier for this group. For students from higher-income households, disposable income might reduce such barriers, potentially altering how environmental Cues to Action (e.g., invitations to bars) translate into behavior. Investigating income as a moderator is therefore crucial for understanding how socioeconomic realities interact with health beliefs.

By systematically examining these moderating effects, this study addresses a critical gap. It moves beyond a simplistic model to explore how the relationships between beliefs and behaviors are shaped by the demographic realities of sex, age, and income within the specific cultural context of the Philippines.

3. Materials and Methods

3.1. Methodology and Research Design

This study was conducted to provide a comprehensive analysis of the factors influencing unhealthy drinking habits among university students, grounded in the Health Belief Model (HBM). A quantitative, descriptive-correlational research design was employed. This approach allows for the measurement of the relationships between psychological constructs (Perceived Threat, Perceived Benefits, Perceived Barriers, Self-Efficacy, and Cues to Action) and the behavioral outcome (unhealthy drinking). The design was specifically structured to extend beyond simple correlation by incorporating moderation analysis. This was essential to address the study's objective of examining whether demographic characteristics (age, sex, and monthly family income) alter the strength and nature of the relationship between students' health beliefs and their drinking behaviors.

3.2. Participants

The study was conducted at North Eastern Mindanao State University Cantilan Campus, involving a sample of 374 student respondents. The demographic profile of the participants is detailed in Table 1. The sample consisted primarily of students aged 18–21 years and from households with a monthly family income below ₱10,000 (74.9%). A key characteristic of the sample is a significant overrepresentation of male respondents (85.8%). This distribution is likely a reflection of the specific academic programs from which participants were drawn, which have a disproportionately high male enrollment. This gender imbalance is an important limitation to note, as it affects the generalizability of the findings to the broader, more gender-balanced university population.

3.3. Research Instruments

The survey instrument comprised three main sections. The first section presented the informed consent, which detailed the study's objectives, confidentiality measures, and the voluntary nature of participation. The second section collected demographic data (age, sex, and monthly family income) to be used as moderator variables.

The third section consisted of validated scales adapted from established HBM literature to measure the core constructs, based on the framework developed by Champion & Skinner (2008). To ensure the instrument's cultural appropriateness and

content validity within the local context, a multi-step adaptation process was undertaken. First, the adapted items were reviewed by a panel of experts, including an educational technologist and a psychometrician, to evaluate their clarity and relevance to Filipino university students. Following this expert validation, a pilot test was conducted with a sample of 30 students who did not participate in the main study. This procedure aimed to assess the comprehensibility of the questions and identify any ambiguous phrasing. Feedback from the pilot phase led to minor wording refinements to ensure the items were linguistically and culturally suitable.

Table 1 Distribution of Respondents (N = 374).

Profile	Category	Frequency (N)	Percentage (%)
Age	18–19	202	54.0
	20–21	100	26.7
	22–23	50	13.4
	24 and above	22	5.9
Sex	Male	321	85.8
	Female	53	14.2
Monthly Family Income	Below ₱10,000	280	74.9
	₱10,000 – ₱29,999	71	19.0
	₱30,000 – ₱59,999	16	4.3
	₱100,000 and above	7	1.9
Total	—	374	100.0

All construct items were measured on a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). In the current study, all scales demonstrated good to excellent internal consistency: Perceived Threat (Cronbach's α = .82), Perceived Benefits (α = .85), Perceived Barriers (α = .79), Self-Efficacy (α = .91), and Cues to Action (α = .88).

3.4. Data Gathering Procedure

The survey was administered to student participants following approval from both institutional and ethical review boards. Eligible respondents were carefully identified based on predefined inclusion criteria, which included being currently enrolled students in the target program, aged 18 years or older, and willing to provide informed consent. Students who did not meet these criteria or who were unavailable during the data collection period were excluded.

Data were collected using a structured questionnaire, disseminated via a digital platform to ensure efficient distribution, accessibility, and accurate data capture. Prior to the main survey, the questionnaire underwent a pilot test with a small subset of the target population to assess clarity, relevance, and reliability of the items. Feedback from the pilot test was incorporated to refine the instrument and enhance content validity. All respondents were presented with an informed consent form outlining the study's purpose, voluntary nature of participation, confidentiality assurances, and their right to withdraw at any time without penalty. Anonymity and confidentiality were strictly maintained by not collecting personally identifiable information and securely storing all responses in password-protected files accessible only to the research team. Additional measures, such as restricting multiple submissions and monitoring response completeness, were implemented to ensure data quality and reliability.

3.5. Data Analysis

Data were analyzed using IBM SPSS Statistics Version 28 to examine the relationships between Health Belief Model (HBM) constructs and unhealthy drinking habits among students. Descriptive statistics (frequency and percentage) summarized the demographic profile, including age, sex, and family income. Pearson correlation analysis assessed bivariate associations between each HBM construct—Perceived Threat, Perceived Benefits, Perceived Barriers, Self-Efficacy, and Cues to Action—and unhealthy drinking, indicating the strength and direction of relationships. Multiple linear regression was used to evaluate the predictive influence of the HBM constructs while controlling for other variables, with unstandardized coefficients, t-values, and p-values determining statistical significance. Moderation analysis employing interaction terms examined whether demographic factors (age, sex, and income) altered the relationships between HBM constructs and unhealthy drinking. Assumptions of normality, multicollinearity, linearity, and homoscedasticity were assessed to ensure model validity. Significance was set at $p < .05$. This integrated approach provided a rigorous evaluation of both direct and conditional effects of cognitive and demographic factors on students' drinking behaviors.

4. Results

This section details the statistical analyses conducted to address the research questions. The findings are organized into three parts: descriptive statistics and correlations, multiple regression analysis, and moderation analysis.

4.1. Participant Characteristics

The study included 374 student participants. The sample was predominantly male (85.8%), between 18–19 years of age (54.0%), and from households with a monthly family income below ₱10,000 (74.9%). A complete breakdown of the demographic characteristics is provided in Table 2.

Table 2 Demographic Profile of Respondents by Age, Sex, and Monthly Family Income.

Demographic Variable	Frequency	Percentage (%)
AGE		
18–19	202	54.01
20–21	100	26.74
22–23	50	13.37
24 and above	22	5.88
TOTAL	374	100
SEX		
Male	321	85.83
Female	53	14.17
TOTAL	374	100
MONTHLY FAMILY INCOME		
Below ₱10,000	280	74.87
₱10,000 – ₱29,999	71	18.98
₱30,000 – ₱59,999	16	4.28
₱100,000 and above	7	1.87
TOTAL	374	100

4.2. Descriptive Statistics and Bivariate Correlations

To examine the relationships between the study variables, a Pearson correlation analysis was conducted. The results, detailed in Table 3, showed that all Health Belief Model (HBM) constructs were significantly and positively correlated with unhealthy drinking.

Specifically, unhealthy drinking had the strongest associations with Perceived Barriers (r = .73, p < .001), Cues to Action (r = .72, p < .001), and Perceived Benefits (r = .70, p < .001). Moderate positive correlations were observed with Self-Efficacy (r = .55, p < .001) and Perceived Threat (r = .52, p < .001). Additionally, several HBM constructs were highly intercorrelated, notably Perceived Benefits with Perceived Barriers (r = .83) and Perceived Threat with Self-Efficacy (r = .78).

Table 3 Correlation Matrix of Health Belief Model Constructs and Unhealthy Drinking Habits Among Students.

	Perceived Threat	Perceived Benefits	Perceived Barriers	Self-Efficacy	Cues to Action	Unhealthy Drinking
Perceived Threat	r=1.0000	r=0.3885	r=0.3864	r=0.7817	r=0.6329	r=0.5159
Perceived Benefits	r=0.3885	r=1.0000	r=0.8260	r=0.3839	r=0.6201	r=0.7001
Perceived Barriers	r=0.3864	r=0.8260	r=1.0000	r=0.3498	r=0.6496	r=0.7310
Self-Efficacy	r=0.7817	r=0.3839	r=0.3498	r=1.0000	r=0.6814	r=0.5514
Cues to Action	r=0.6329	r=0.6201	r=0.6496	r=0.6814	r=1.0000	r=0.7159
Unhealthy Drinking	r=0.5159	r=0.7001	r=0.7310	r=0.5514	r=0.7159	r=1.0000

4.3. Multiple Regression Analysis

To identify which Health Belief Model (HBM) constructs were the strongest predictors of unhealthy drinking, a multiple linear regression analysis was performed. The overall model was statistically significant (F(5, 368) = 156.45, p < .001) and explained approximately 68% of the variance in unhealthy drinking habits (R^2 = .68).

The individual contributions of the predictors are detailed in Table 4. Four of the five HBM constructs were found to be significant positive predictors of unhealthy drinking. Perceived Barriers emerged as the strongest predictor (β = .35, p < .001), followed by Cues to Action (β = .29, p < .001), Self-Efficacy (β = .23, p < .001), and Perceived Benefits (β = .16, p = .001). Perceived Threat was not a significant predictor in the model (p = .807).

Table 4 Multiple Regression Analysis of Health Belief Model Constructs Predicting Unhealthy Drinking Habits.

Variable	Coefficient	Std_Error	t_value	p_value
Intercept	-0.0432	0.176	-0.2453	0.8063
Perceived Threat	0.016	0.0654	0.2443	0.8071
Perceived Benefits	0.1532	0.0458	3.3465	0.0009
Perceived Barriers	0.3118	0.0499	6.244	< .001
Self-Efficacy	0.2236	0.0642	3.4835	0.0006
Cues to Action	0.2876	0.0633	4.5407	< .001

4.4. Moderation Analysis

Finally, moderation analyses were conducted to test whether the relationships between the HBM constructs and unhealthy drinking were conditional upon demographic factors. The results, summarized in Table 5, revealed several significant interaction effects.

Sex was found to be a significant moderator for all five HBM-behavior relationships. Significant interactions were found for Perceived Threat (B = -0.34, p = .028), Perceived Benefits (B = -0.33, p = .007), Perceived Barriers (B = -0.41, p < .001), Self-Efficacy (B = -0.49, p < .001), and Cues to Action (B = -0.60, p < .001).

Age significantly moderated the predictive utility of two constructs. The interaction was significant for Self-Efficacy (B = 0.16, p = .008) and Cues to Action (B = 0.19, p < .001).

Monthly family income did not significantly moderate any of the relationships between the HBM constructs and unhealthy drinking (all ps > .05).

Table 5 Moderation Analysis of Demographic Characteristics on the Relationship Between Health Belief Model Constructs and Unhealthy Drinking Habits.

HBM Construct	Moderator	Interaction Coefficient	p-value
Perceived Threat	Age	0.0769	0.2378
	Sex	-0.3395	0.0276
	Income	0.1166	0.1367
Perceived Benefits	Age	0.0217	0.5035
	Sex	-0.3303	0.0069
	Income	0.0449	0.3153
Perceived Barriers	Age	0.0350	0.2373
	Sex	-0.4047	0.0007
	Income	0.0023	0.9563
Self-Efficacy	Age	0.1641	0.0078
	Sex	-0.4880	0.0002
	Income	0.0719	0.3682
Cues to Action	Age	0.1892	0.0001
	Sex	-0.5970	0.0000
	Income	0.0467	0.3994

5. Discussion

The demographic composition of the respondents—predominantly young (18–19 years), male, and from low-income households—reflects a population segment consistently identified in recent literature as being at elevated risk for unhealthy alcohol consumption. The transition to university life during late adolescence is a critical developmental period characterized by increased autonomy and exposure to peer-driven drinking norms (Buková et al., 2024; Hong et al., 2023). The strong male predominance in the sample aligns with global evidence indicating that male students are more likely to engage in heavy episodic drinking, a pattern often attributed to gendered social expectations (Kejriwal, 2025; Wang et al., 2023). This demographic profile provides important contextual grounding for interpreting the subsequent behavioral and cognitive findings.

The results revealed that students' drinking behavior is more strongly influenced by immediate facilitators and situational prompts than by abstract health considerations. Specifically, perceived barriers, perceived benefits, and cues to action exhibited the strongest relationships with unhealthy drinking, a pattern consistent with recent behavioral health research (Cortés-Tomás et al., 2022; Zhang et al., 2020). The strong predictive power of perceived barriers suggests that students who face greater difficulty in avoiding alcohol—due to social pressure, limited alternative activities, or coping needs—are more likely to engage in problematic drinking (Hallihan et al., 2022). Similarly, the high correlation for cues to action underscores the powerful role of environmental triggers, such as peer invitations and campus drinking cultures, in increasing both the frequency and quantity of alcohol consumption (Chen et al., 2021; Strowger et al., 2022).

When examined simultaneously in the regression analysis, Perceived Barriers emerged as the strongest predictor of unhealthy drinking, followed by Cues to Action, Self-Efficacy, and Perceived Benefits. This finding indicates that student alcohol consumption is driven less by a lack of health awareness and more by immediate psychological and environmental factors (Babor, 2022; Jones et al., 2019). The powerful influence of Perceived Barriers, in particular, suggests that students continue to drink largely because they find it difficult to stop—whether due to social pressure or a lack of alternative coping mechanisms (Graupensperger et al., 2020).

A particularly noteworthy and counterintuitive finding was the positive association between self-efficacy and unhealthy drinking. This suggests that the role of self-efficacy in this context is more complex than typically assumed. A critical distinction must be made: the survey may not be capturing self-efficacy for abstinence or moderation, but rather a self-efficacy for managing the consequences of drinking. That is, students may be confident not in their ability to refuse a drink, but in their ability to handle heavy drinking—to socialize effectively while intoxicated, to fulfill academic responsibilities despite hangovers,

and to mitigate immediate negative outcomes. This form of confidence, a type of "risk-coping self-efficacy," can function as a cognitive justification that lowers perceived risk and grants a psychological permission to engage in continued heavy drinking (Hagger et al., 2019; Matley & Davies, 2018). This interpretation aligns with theories of illusory control and risk-taking, where an over-inflated belief in one's ability to manage a risky behavior is precisely what facilitates its continuation, especially when reward sensitivity is high (Sistad et al., 2019; Verdejo-García et al., 2019).

In stark contrast, perceived threat did not significantly predict unhealthy drinking behavior. This is consistent with extensive research showing that perceived risk often has weak associations with actual drinking among students, as immediate social rewards and normative influences tend to outweigh long-term health concerns (Crisafulli et al., 2024; Napper et al., 2015). This finding underscores the limitations of fear-based or information-only interventions, which often fail to alter behavior in the absence of strategies that target the more immediate social and motivational drivers of consumption (Lee, 2018).

The moderation analysis revealed that sex significantly moderates the relationship between all Health Belief Model constructs and unhealthy drinking, highlighting pronounced gender differences in how health beliefs translate into behavior. This aligns with recent studies suggesting that males tend to be more responsive to social and contextual cues for drinking, while females may be more influenced by perceived risks and consequences (Erol & Karpyak, 2015; Goh et al., 2022). Age also significantly moderated the effects of self-efficacy and cues to action, consistent with developmental evidence that younger students are more susceptible to peer influence and external triggers (Andrade et al., 2023; Steinberg & Monahan, 2007). In contrast, family income did not moderate any of the relationships, supporting the view that once students enter the university environment, social norms and peer dynamics exert a stronger influence on drinking than economic background alone (Perkins, 2002; Peltzer & Pengpid, 2016).

5.1. Limitations and Future Research

The findings of this study should be considered in light of several limitations. First and foremost, the overrepresentation of male respondents (85.8%) in the sample introduces a potential source of bias and restricts the generalizability of the results to the broader student population. This demographic skew is particularly consequential for the moderation analysis by sex. Although the results indicated that sex was a statistically significant moderator for all HBM-behavior relationships, the small size of the female subgroup (n=53) provides limited statistical power, making these findings preliminary. Therefore, the conclusions drawn about the differential impact of health beliefs on unhealthy drinking between males and females should be interpreted with considerable caution. To validate and expand upon these findings, future research should prioritize recruiting a larger and more sex-balanced sample. Such an approach would enable a more robust and reliable examination of how gender shapes the relationship between health beliefs and alcohol consumption among university students.

Overall, these findings support the applicability of the Health Belief Model in explaining unhealthy drinking among university students but also highlight its limitations. The weak role of perceived threat suggests that interventions should move beyond risk communication and instead focus on reducing perceived barriers and limiting exposure to drinking cues (De Leon, 2023). The results provide strong empirical support for tailoring alcohol prevention programs by sex and developmental stage, ensuring that strategies are sensitive to the demographic differences that shape belief-behavior pathways.

6. Conclusions

This study investigated the psychological factors predicting unhealthy alcohol consumption among university students through the Health Belief Model, while also examining the moderating influence of demographic characteristics. The findings reveal that students' drinking behavior is less influenced by their perception of long-term health threats and more powerfully driven by immediate contextual factors, namely perceived barriers, social cues to action, and perceived benefits. The principal contribution of this research lies in its demonstration that the predictive utility of these health beliefs is not uniform. Notably, the influence of constructs such as self-efficacy and cues to action was found to vary by age. The study also provides 7 fone7nar evidence for the moderating role of sex, highlighting a critical interplay between psychological constructs and demographic realities that warrants further investigation. These results challenge the efficacy 7 fone-size-fits-all, information-based health interventions and underscore the need for targeted, demographically-sensitive programs that focus on skill-building to navigate social barriers and environmental triggers. By integrating psychological theory with demographic analysis, this study provides a more nuanced understanding of a complex public health issue, offering a valuable evidence base for developing more effective interventions on university campuses.

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7. Declarations

7.1. Ethical considerations

This study received ethical approval from the University Research and Innovation Office at North Eastern Mindanao State University – Cantilan Campus. All procedures were conducted in accordance with the institutional ethical guidelines for research involving human subjects. Informed consent was obtained from all participants prior to data collection. Participants were explicitly informed that their involvement was voluntary and that they retained the right to withdraw from the study at any time without penalty. To ensure confidentiality, all data were collected anonymously, and the digital records were stored securely with access restricted solely to the research team.

7.2. Use of artificial intelligence (AI)

The author acknowledge the use of specific AI-assisted technologies to support the preparation of this manuscript, adhering to ethical guidelines. Consensus AI was utilized to assist in the discovery of relevant literature during the review phase. Google AI Studio and Grammarly were used exclusively for language refinement, paraphrasing, and grammatical correction to enhance readability and flow. The author confirm that no AI tools were used for data generation, statistical analysis, or the scientific interpretation of results. All data processing (using SPSS), and conclusions are the original work of the authors. The author have critically reviewed all AI-assisted output and take full responsibility for the content of the work.

7.3. Conflict of Interest

The authors declare no conflicts of interest.

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