

Research Article

At-risk/problem gambling among healthcare workers: An analytical cross-sectional study

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Abstract

Objective: This study aimed to examine the frequency of at-risk/problem gambling among healthcare workers (HCWs) and to identify associated sociodemographic and behavioral factors. **Methods:** This cross-sectional study was conducted among HCWs of a public university hospital. A total of 236 participants who completed an online survey were included in the analysis. Gambling severity was assessed using the Problem Gambling Severity Index (PGSI). Participants were categorized as non-problem gambling (PGSI=0) and at-risk/problem gambling (PGSI≥1). Group differences were examined and variables associated with gambling status were entered into a multivariable logistic regression model to identify factors independently associated with gambling status. **Results:** Overall, 19.9% of participants were classified as at-risk/problem gamblers. Gambling status was significantly associated with gender, education level, occupation, tobacco use, gambling account ownership, gambling application use, and age. In multivariable analysis, tobacco use, gambling application use, physicians (among the occupational groups assessed) and younger age remained independently associated with at-risk/problem gambling. **Conclusion:** At-risk and problem gambling behaviors are present among HCWs and are associated with identifiable demographic and behavioral factors. These findings underscore the importance of increasing awareness within healthcare institutions and implementing preventive and early identification strategies to mitigate potential individual and occupational consequences.

Keywords: Gambling, Health personnel, Pathological gambling, Risk factor

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INTRODUCTION

Gambling is increasingly recognized as a public health issue, as its harms extend beyond individuals who meet the full diagnostic criteria for gambling disorder and may affect families, workplaces, and healthcare systems. Conceptual and empirical studies emphasize that gambling-related harms occur along a continuum and propose a taxonomy encompassing financial, relational, emotional/psychological, health, cultural, and occupational or educational domains (Langham et al., 2016).

Gambling behavior exists on a broad spectrum, ranging from recreational participation to risky patterns associated with escalating losses, functional impairment, and wider harms. Structural characteristics of gambling products—such as rapid event frequency, near-miss features, continuous betting opportunities, and online accessibility—together with environmental factors like aggressive marketing and easy smartphone access, may increase the likelihood of persistent gambling and related harm, even among individuals without a formal diagnosis (Wardle et al., 2024).

In current diagnostic nosology, gambling disorder is classified among addictive disorders in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) due to its shared phenomenology with substance use disorders, including impaired control and continued engagement despite adverse consequences (American Psychiatric Association, 2013). Similarly, the International Classification of Diseases, 11th Revision (ICD-11) recognizes gambling disorder and distinguishes predominantly online and offline forms (World Health Organization, 2022). However, an exclusive focus on diagnosable disorders may overlook a broader group experiencing clinically meaningful gambling-related harms. Consequently, many studies conceptualize “at-risk” and “problem” gambling as a single category, contrasted with “non-problem” gambling, in line with harm-continuum models (Browne & Rockloff, 2018; Wardle et al., 2024).

Empirical evidence has linked at-risk and problem gambling to mental health symptoms and substance use (Dowling et al., 2019) and qualitative research further suggests that gambling may function as an escape-oriented coping strategy, a mechanism consistent with stress-related pathways that may be particularly relevant in shift-based healthcare environments (Wood & Griffiths, 2007). Work-related stressors and irregular schedules may interact with the widespread availability of online gambling, creating opportunities for frequent, short-duration betting episodes. Although such behaviors may be difficult to detect, they can still result in substantial harm.

Problem gambling is associated with a wide range of adverse outcomes, including financial strain, interpersonal conflict, and psychiatric comorbidity. Notably, meta-analytic evidence indicates an elevated risk of suicidal ideation, suicide attempts, and suicide mortality among individuals with gambling problems or disorders, underscoring the importance of early identification of risky gambling patterns (Armoon et al., 2023; Kristensen et al., 2024).

From a prevention perspective, individuals classified as “at-risk” or “problem” gamblers are particularly important, as they may represent an earlier stage along the harm continuum. Interventions at this stage have the potential to prevent progression and reduce adverse outcomes. Population-based studies have demonstrated a prevention paradox, whereby a substantial proportion of the overall harm burden arises from larger groups experiencing lower or moderate levels of severity (Browne & Rockloff, 2018). Accordingly, in the present study, participants were categorized as “at-risk/problem gamblers” (i.e., any level of elevated risk or problem severity) or “non-problem gamblers.” This approach was adopted to increase statistical power in risk factor analyses and to align with a public health perspective that prioritizes the identification of employees experiencing potentially modifiable harms before progression to more severe disorder.

HCWs constitute an important population for research on risky gambling for several reasons. First, HCWs constitute large and diverse workforces with varying sociodemographic characteristics, and shift-based schedules may influence both gambling opportunities and coping behaviors. Second, gambling-related harms among healthcare workers may affect not only individual well-being but also work performance and patient safety. Finally, evidence suggests that healthcare providers do not consistently inquire about gambling problems during clinical encounters, indicating potential gaps in awareness and routine screening that could be addressed through occupational research (Christensen et al., 2001).

To date, research on gambling behavior among HCWs has been limited compared with studies conducted in general population samples. Moreover, context-specific factors, such as shift work and stress exposure, may modify risk. Therefore, the present study aimed to estimate the prevalence of at-risk/problem gambling among HCWs and to examine associated factors.

METHODS

Ethical approval for this study was obtained from the Ethics Committee of the first author's institution (July 9, 2025; Approval number: 14). The study was conducted in accordance with the ethical standards of the relevant research committee and with the 1964 Declaration of Helsinki and its subsequent amendments.

Study Design and Sample

This cross-sectional study was conducted among HCWs of a public university hospital. Data were collected via an online survey. The questionnaire, designed by the researchers using Google Forms, was distributed to all HCWs via the hospital information management system and WhatsApp groups. To prevent duplicate responses, participants were required to log in before completing the survey. Participants were assured of data confidentiality,

and no identifying information, such as names, was requested. An informed consent form was presented prior to accessing the questionnaire, and participants were informed that they could withdraw from the study at any time without providing a reason.

Inclusion criteria were employment as a healthcare worker at the hospital and age ≥ 18 years. According to information obtained from the hospital administrative unit, 908 employees were actively working during the study period. A total of 289 individuals participated in the survey; 28 were excluded for not providing informed consent, and 25 were excluded due to inconsistent or inappropriate responses in the sociodemographic section. Ultimately, 236 participants who completed the questionnaire in full were included in the analyses. The initial response rate was 31.8% (289/908), while the final valid response rate after exclusions was 26.0% (236/908). No missing data were present in the final dataset; therefore, complete-case analysis was performed.

Data Collection Tools

Sociodemographic form

The sociodemographic form developed by the researchers included variables such as age, gender, marital status, income level, occupation, and alcohol–substance–tobacco use. Participants were also asked whether they had a mobile gambling account or gambling application, lifetime participation in gambling activities, and participation in gambling activities within the past year. For clarification purposes, a definition of gambling was provided, stating that activities such as purchasing national lottery tickets, scratch cards, playing games (e.g., okey or dice) for money, sports betting/match predictions, casino/slot games, roulette, blackjack (21), and similar card games are all considered gambling activities.

Problem Gambling Severity Index

The Problem Gambling Severity Index (PGSI), developed by Ferris and Wynne (2001), was used to assess gambling behavior and its adverse

consequences. The scale consists of 9 items rated on a 4-point Likert scale (0 = never, 1 = sometimes, 2 = most of the time, 3 = almost always). Total scores range from 0 to 27. Based on total scores, respondents' risk levels for problem gambling are determined. The original internal consistency and test-retest reliability coefficients were reported as 0.84 and 0.78, respectively. The Turkish version was validated by Arcan (2020), with a Cronbach's α coefficient of 0.82. In the original scoring, 0 indicates non-problem gambling, 1–2 low risk, 3–7 moderate risk, and ≥ 8 problem gambling. However, considering critiques regarding the population used in scale development, previous studies have suggested that scores ≥ 5 indicate problem gambling and scores 1–4 indicate at-risk gambling (Stone et al., 2015; Williams & Volberg, 2014). In the present study, participants scoring 0 were classified as non-problem gambling, and those scoring ≥ 1 were classified as at-risk/problem gambling. This categorization was chosen to reflect a broader risk spectrum in line with a harm-continuum perspective. In the current sample, Cronbach's α and McDonald's ω coefficients were both 0.95.

Statistical Analysis

Data were analyzed using jamovi version 2.6 (2024). The distribution of continuous variables was assessed using both visual (histograms and Q-Q plots) and analytical methods. Descriptive statistics were presented as mean $\pm$ standard deviation for continuous variables and as number (n) and percentage (%) for categorical variables.

Participants were categorized into two groups based on PGSI scores: non-problem gambling and at-risk/problem gambling. Tobacco and alcohol use variables were presented as multi-category variables in the descriptive table. However, for group comparisons, these variables were dichotomized to ensure adequate expected cell frequencies and increase statistical power (Tobacco use: no/former smoker vs. current smoker; Alcohol use: < 1 /month vs. ≥ 1 /month). Dichotomization was performed considering both clinical relevance and sample size.

Associations between at-risk/problem gambling status and categorical variables were examined using Pearson's chi-square test. When more than 20% of expected cell frequencies were below 5 or when any expected cell frequency was below 5, Fisher's Exact Test was used. Effect sizes were reported using Cramer's V coefficient. For variables with three or more categories (e.g., occupation), Bonferroni-adjusted post-hoc analyses were conducted to identify cell-based differences when overall significance was observed. Substance use was excluded from analyses due to low frequencies. Age was compared between the two groups using independent samples t-test.

Binary logistic regression analysis was performed to identify factors independently associated with gambling status. The multivariable model included gender, occupation, tobacco use, presence of a gambling application, and age. The gambling account variable was excluded due to conceptual and statistical overlap with the gambling application variable to reduce the risk of multicollinearity. The association between gambling account ownership and mobile application use was examined and found to be strong ($\phi = 0.665$), supporting the inclusion of only one of these variables in the multivariable model. Additionally, gambling application use was considered a more current and behaviorally specific indicator. To reduce the risk of overfitting, the number of variables included in the multivariable model was restricted in relation to the number of outcome events. Although education level was associated with gambling status in bivariate analyses, it was not included in the final model to preserve model parsimony. In addition, the distribution of education categories was imbalanced, with a relatively small proportion of participants in the lower education group. For the logistic regression model, β coefficients, standard errors (SE), Wald statistics, p values, odds ratios (OR), and 95% confidence intervals (CI) were reported. Model fit was evaluated using the Hosmer–Lemeshow test, and discriminative ability was assessed using the area under the receiver operating characteristic curve (AUC).

Table 1. Characteristics of the study sample

Variables	Categories	n	%	Mean±SD
Age				37.00±8.43
Sex	Female	127	53.8	
	Male	109	46.2	
Marital status	Single	64	27.1	
	Married	164	69.5	
	Divorced	8	3.4	
Education level	High school or below	24	10.2	
	University or higher	212	89.8	
Occupation	Physicians	126	53.4	
	Nurses and allied health personnel	66	28.0	
	Other hospital staff	44	18.6	
Income level	Low	39	16.6	
	Medium	73	30.9	
	High	124	52.5	
Shift work	Daytime only	130	55.1	
	Night shifts (including rotating)	106	44.9	
Tobacco use	No	114	48.3	
	Former user	28	11.9	
	≤10 cigarettes/day	34	14.4	
	>10 cigarettes/day	60	25.4	
Alcohol use	No	101	42.8	
	≤1 time/month	67	28.4	
	2–4 times/month	54	22.9	
	≥2 times/week	14	5.9	
Substance use	No	230	97.5	
	Former user	4	1.7	
	Yes	2	0.8	
Gambling account	No	201	85.2	
	Yes	35	14.8	
Gambling app on mobile	No	215	91.1	
	Yes	21	8.9	
Family history of gambling	No	223	94.5	
	Yes	13	5.5	
Lifetime gambling	No	79	33.5	
	Yes	157	66.5	
Past-year gambling	No	183	77.5	
	Yes	53	22.5	
Problem gambling	Non-problem	189	80.1	
	At-risk/problem gambling	47	19.9	

All analyses were two-tailed, and $p < 0.05$ was considered statistically significant.

RESULTS

A total of 236 HCWs were included in the study. The mean age of the participants was 37.00 ± 8.43

years. Of the participants, 53.8% were female ($n = 127$), and 69.5% were married. The vast majority had a university degree or higher level of education (89.8%). Regarding professional distribution, 53.4% were physicians, 28.0% were nurses or allied health personnel, and 18.6% were other HCWs. Additionally, 44.9% of the participants worked night or rotating shifts. According to the problem gambling classification, 80.1% were categorized as non-problem gamblers, whereas 19.9% were classified as at-risk/problem gamblers. Among participants classified as at-risk/problem gambling ($n = 47$), 23 (48.9%) were in the low-risk category (scores 1–2), 14 (29.8%) were in the moderate-risk category (scores 3–7), and 10 (21.3%) met the threshold for problem gambling (scores ≥ 8). Using alternative cut-offs, 33 individuals were classified as at-risk (scores 1–4) and 14 as problem gambling (scores ≥ 5). Detailed sociodemographic characteristics are presented in Table 1.

When the at-risk/problem gambling group was compared with the non-problem group, a significant difference was observed in gender distribution ($p = 0.040$), with a higher proportion of at-risk/problem gambling among males. Educational level was also significantly associated with gambling status ($p = 0.031$); individuals with a high school education or lower had a significantly higher prevalence of at-risk/problem gambling. A significant difference was found across occupational groups ($p = 0.029$), with physicians demonstrating a higher prevalence of at-risk/problem gambling compared with nurses and allied health personnel. Smoking status was significantly associated with at-risk/problem gambling ($p = 0.006$), and the prevalence was higher among smokers.

The presence of a gambling account ($p < 0.001$) and having a mobile gambling application installed ($p < 0.001$) were both strongly associated with at-risk/problem gambling. In contrast, no significant differences were observed between groups with respect to marital status, income level, shift system,

alcohol use, or family history of gambling ($p > 0.05$). Detailed results of the bivariate analyses are presented in Table 2.

In terms of continuous variables, the mean age of the at-risk/problem gambling group (33.5 ± 6.36 years) was significantly lower than that of the non-problem group (37.9 ± 8.68 years) ($p < 0.001$).

A multivariable logistic regression analysis was conducted to identify independent factors associated with at-risk/problem gambling (Table 3). Age, gender, occupation, smoking status, and presence of a mobile gambling application were included in the model. The overall model was statistically significant ($\chi^2 = 47.5$, $p < 0.001$), with a McFadden's R^2 of 0.202. The model demonstrated good discriminatory ability (AUC = 0.791).

In the multivariable analysis, younger age was independently associated with at-risk/problem gambling (OR = 0.94, 95% CI: 0.90–0.99, $p = 0.018$). Each additional year of age was associated with an approximately 6% decrease in the odds of at-risk/problem gambling.

Regarding occupational groups, using nurses and allied health personnel as the reference category, physicians had significantly higher odds of at-risk/problem gambling (OR = 4.22, 95% CI: 1.45–12.24, $p = 0.008$). Current smokers had approximately three times higher odds of at-risk/problem gambling compared with participants who were not current smokers (OR = 3.26, 95% CI: 1.46–7.28, $p = 0.004$).

The strongest association was observed for the presence of a mobile gambling application. Individuals who had a gambling application installed on their mobile device had approximately tenfold higher odds of at-risk/problem gambling (OR = 10.01, 95% CI: 3.38–29.60, $p < 0.001$). Gender was no longer independently significant in the multivariable model ($p = 0.634$).

Table 2. Comparison of participant characteristics according to gambling risk status

Variables	Non-problem gambling (n=189)	At-risk/problem gambling (n=47)	χ^2	p	Effect size (Cramer's V)
	<i>n</i>	<i>n</i>			
Sex			4.23	0.040	0.134
Female	108	19			
Male	81	28			
Marital Status			0.346	0.557	0.038
Married	133	31			
Single/divorced	56	16			
Education level			-	0.031 [†]	0.148
High school or below	15	9			
University or higher	174	38			
Occupation			7.10	0.029	0.173
Physicians	97	29 ^a			
Nurses and allied health personnel	60	6 ^b			
Other hospital staff	32	12 ^a			
Income level			1.96	0.375	0.091
Low	29	10			
Medium	62	11			
High	98	26			
Shift work			1.62	0.202	0.083
Daytime only	108	22			
Night shifts (including rotating)	81	25			
Tobacco use			7.60	0.006	0.179
No/former smoker	122	20			
Yes (current smoker)	67	27			
Alcohol use			2.27	0.131	0.098
<1/month	123	25			
≥1/month	66	22			
Gambling account			54.0	<0.001	0.479
No	177	24			
Yes	12	23			
Gambling app on mobile			-	<0.001 [†]	0.366
No	182	33			
Yes	7	14			
Family history of gambling			-	0.143 [†]	0.112
No	181	42			
Yes	8	5			
	Non-problem gambling (n=189)	At-risk/problem gambling (n=47)	<i>t</i>	<i>p</i>	
Age	37.9±8.68	33.5±6.36	3.86	<0.001	

Different superscript letters indicate statistically significant differences between groups (Bonferroni-adjusted).

[†] Fisher's exact test was used because at least one expected cell count was below 5; therefore, no χ^2 statistic is reported for these comparisons.

Table 3. Multivariable logistic regression analysis of factors associated with at-risk/problem gambling							
Factor	β	SE	Z	p	OR	95% CI	
						Lower	Upper
Age	-0.059	0.025	-2.365	0.018	0.943	0.898	0.990
Sex (Ref: Female)	0.182	0.383	0.476	0.634	1.200	0.567	2.540
Occupation (Ref: Nahp)							
Physicians	1.440	0.543	2.650	0.008	4.220	1.455	12.241
Other staff	1.074	0.600	1.790	0.073	2.928	0.903	9.495
Tobacco use (Ref: No/former smoker)	1.181	0.410	2.880	0.004	3.258	1.459	7.279
Gambling App (Ref: No)	2.303	0.553	4.163	<0.001	10.008	3.383	29.600

Nahp: Nurses and allied health personnel
 β values represent log-odds. OR = odds ratio; CI = confidence interval. The model was statistically significant ($\chi^2(6)=47.5$, $p < 0.001$; McFadden $R^2 = 0.202$; AUC = 0.791).

DISCUSSION

In the present study, factors associated with at-risk/problem gambling (defined by combining at-risk and problem gambling into a single outcome variable) among HCWs were examined. The findings indicate that at-risk/problem gambling was significantly more prevalent among younger HCWs, physicians (among the occupational groups assessed), smokers, and individuals with a mobile gambling application installed on their devices. Conceptualizing at-risk and problem gambling within a single category is particularly meaningful from a workplace-based prevention perspective. Within the framework of the prevention paradox, although severe problem gambling represents a relatively small proportion of individuals, a substantial share of total harm may arise from those in the low-to-moderate risk group (Wardle et al., 2019). In high-responsibility and high-stress professions such as HCWs, even lower levels of risky gambling behavior may have indirect effects on job performance, attention, financial stress, and psychosocial well-being.

Differences in gender, education level, and occupational group were identified in relation to at-risk/problem gambling. Gender differences have been widely documented in the epidemiology of problem gambling, with males generally reported to exhibit higher prevalence rates (Cunningham-

Williams et al., 1998; Girone et al., 2024). However, the loss of statistical significance for gender in the multivariable model suggests that its effect may be mediated by more proximal determinants such as age, occupational distribution, and particularly digital access. Indeed, contextual shifts such as those observed during the COVID-19 pandemic have demonstrated changes in gambling patterns across product types, including altered dynamics in subtypes such as sports betting (Otis et al., 2022). Emerging evidence also suggests that gambling behaviors and harm patterns may interact with broader gender identity dimensions (Malkin & Stacey, 2024).

The higher prevalence of at-risk/problem gambling among individuals with a high school education or lower indicates that, even within a healthcare workforce, socioeconomic and health literacy differences may translate into differential engagement in risk behaviors. This finding may reflect mechanisms such as misperception of gambling odds, financial vulnerability, limited coping repertoires, or differences in risk-related knowledge and attitudes. However, given that education level was not included in the multivariable model, further analyses incorporating this variable alongside other covariates would be useful to clarify the robustness of this association. The finding that physicians exhibited a higher likelihood of at-risk/problem gambling, and that this association remained

strong in the multivariable analysis, represents one of the more notable results of the present study. Gambling participation and problematic patterns have previously been reported in samples closely connected to healthcare settings (Petry & Mallya, 2004). The medical profession is characterized by long working hours, high cognitive demands, substantial responsibility, performance pressure, and an elevated risk of burnout. In this context, gambling may function for some individuals as a form of escape or emotional regulation. Although physicians may have higher income levels, the absence of a significant association between income and at-risk/problem gambling in the present study suggests that behavioral vulnerability, stress, and accessibility may be more relevant than financial capacity *per se*. Nonetheless, the relatively limited sample size within occupational subgroups and potential selection effects within specific clinical units should be considered when interpreting these findings. In addition, the relatively elevated prevalence observed among other hospital staff may reflect heterogeneous occupational stressors and varying levels of job control. The lack of statistical significance in the multivariable model may be related to the smaller subgroup size and reduced statistical power. The absence of a significant association with income despite marked occupational differences may be explained by several complementary mechanisms. Gambling behavior may be more closely linked to accessibility and exposure than to disposable income, as online platforms and mobile applications enable sustained engagement even with low financial entry thresholds. Occupational categories may differentiate psychosocial burdens—such as job stress, burnout, sleep disruption, and emotion regulation demands—independently of income level. Thus, the occupation variable may function as a higher-order indicator capturing institutional and psychological determinants not fully reflected by income measures. Additionally, the use of self-reported and broadly categorized income levels may have reduced the ability to detect statistical associations.

The lower mean age observed in the at-risk/problem gambling group, together with the finding that increasing age was independently associated with lower odds of at-risk/problem gambling in the multivariable model, suggests that younger employees may have a higher likelihood of being in the at-risk/problem gambling category. This finding is consistent with longitudinal evidence identifying younger age as an important risk factor for problem gambling (Dowling et al., 2017). Recent population-based analyses have also demonstrated variation in gambling disorder burden across age groups (Salonen et al., 2022). Increased access to gambling through mobile technologies, greater familiarity with digital platforms, higher levels of impulsivity or novelty seeking, and peer influences may be particularly salient among younger individuals. These findings suggest that occupational health services may consider prioritizing screening and educational initiatives for newly recruited and younger staff.

The association between smoking and at-risk/problem gambling remained significant in both bivariate and multivariable analyses. This pattern may reflect the clustering of risk behaviors and shared psychosocial determinants such as stress, impulsivity, reward sensitivity, and coping difficulties (Lorains et al., 2011; Petry, 2005). From a workplace health perspective, this finding suggests that integrated approaches—combining gambling risk assessment with smoking cessation programs, stress management, and mental health support—may be more effective than addressing gambling in isolation. Given that smoking is relatively easy to screen in routine occupational health assessments, it may also serve as a practical entry point for identifying individuals at elevated gambling risk. Studies conducted among healthcare students similarly suggest that gambling and other behavioral addictions may co-occur and may be associated with younger age and digital usage patterns (Cicolini et al., 2018; Comparcini et al., 2018). When considered alongside the findings related to age and mobile applications in the present study, this underscores the potential value of incorporating early screening

and educational interventions not only in clinical settings but also during training and orientation processes.

The strongest association observed in the present study was between at-risk/problem gambling and the presence of a mobile gambling application, with a similarly strong association for having a gambling account in bivariate analyses. These findings highlight the potential importance of digital accessibility in the contemporary gambling ecosystem (Delfabbro & King, 2020; Hing et al., 2014). Mobile applications facilitate constant access, rapid transactions, personalized notifications, near-win experiences, and immediate reward cycles, thereby potentially reinforcing risky usage patterns. In high-intensity and irregular work environments such as hospitals, gambling behavior may be maintained even during brief breaks or short intervals between tasks. Accordingly, beyond individual counseling and referral pathways, institutional awareness programs, digital well-being initiatives, and employee assistance services assume particular importance. Systematic reviews on the prevalence and cross-national variability of problem gambling in the general population emphasize that increasing digitalization and accessibility may reshape risk profiles and highlight the importance of regulatory and preventive strategies (Calado & Griffiths, 2016). Thus, mobile gambling application use should be considered not only as an individual behavioral marker but also a modifiable environmental determinant of access.

No significant differences were identified between groups with respect to marital status, income level, alcohol use, or family history of gambling. These findings are consistent with the heterogeneous results reported in the literature (Abbott, 2020; Afifi et al., 2010; Welte et al., 2004). Contemporary public health frameworks emphasize that gambling-related harm should be evaluated not only in terms of individual sociodemographic characteristics but also in relation to environmental determinants such as accessibility and digitalization (van Schalkwyk et al., 2021; Wardle et al., 2024). In the present

sample, the absence of significant differences for marital status and income may reflect the relatively limited socioeconomic variability within a single hospital workforce and the use of categorical measures (e.g., married/single; income level) that may not fully capture more nuanced psychosocial mechanisms such as social support, stress, or financial strain. Furthermore, the 24/7 accessibility of online and mobile gambling may amplify risk patterns and potentially attenuate the relative influence of traditional sociodemographic variables. An important consideration when interpreting these findings is the absence of psychological variables such as depression, anxiety, stress, and impulsivity, which are well-established correlates of gambling behavior. These factors may act as underlying vulnerabilities influencing both gambling behaviors and related risk factors, such as substance use and occupational stress. Therefore, some of the associations observed in this study may reflect shared underlying psychological mechanisms rather than direct relationships between the examined variables, potentially limiting the interpretability of the findings.

The overall significance and good discriminatory performance of the logistic regression model indicate that the selected variables provide a meaningful framework for understanding at-risk/problem gambling in this population. The inclusion of a strong digital access indicator suggests that opportunity and accessibility may play a central role in shaping risk. The attenuation of gender effects further supports the view that risk is more closely associated with the combined influence of age, occupation, smoking, and digital gambling access.

From an applied perspective, incorporating brief gambling screening tools into routine occupational health assessments, implementing brief interventions targeting high-risk groups (younger employees, physicians, smokers, and mobile application users), and strengthening referral pathways to addiction or psychiatric services may be warranted. The ease of assessing mobile application use offers a practical starting point for workplace screening initiatives.

Additionally, institutional messaging that emphasizes confidentiality, adopts a non-judgmental tone, and focuses on early intervention may help reduce stigma associated with gambling-related concerns.

Limitations

Several limitations should be acknowledged. The response rate was approximately 26%, which may introduce selection bias. Non-response bias analysis could not be conducted due to the anonymous nature of the survey and lack of data on non-respondents. Therefore, the direction of potential bias remains uncertain, as individuals with gambling behaviors may have been either more or less likely to participate. Nevertheless, the sample retained variability across key characteristics (e.g., age range and occupational groups), suggesting some degree of heterogeneity; however, the direction and magnitude of potential bias cannot be determined. The use of a dichotomized PGSI variable (≥ 1) may introduce heterogeneity by combining individuals with varying levels of severity. Accordingly, findings should be interpreted as reflecting a broader risk spectrum rather than clinically defined problem gambling and future studies using alternative cut-offs may help to clarify severity-specific associations. A major limitation of the present study is the absence of psychological variables such as depression, anxiety, stress, and impulsivity, which are well-established correlates of gambling behavior. The lack of these measures may have resulted in unmeasured confounding and limits the interpretation of the observed associations, as these factors could underlie or partially explain the relationships between gambling behavior and the examined sociodemographic and behavioral variables. The relatively low events-per-variable ratio in the multivariable model, particularly given the limited number of outcome events ($n = 47$) relative to the number of predictors included, may have reduced the stability of the estimates and increased the risk of overfitting. Therefore, the regression findings should be interpreted with caution and considered exploratory. In addition, although education level was associated with gambling status

in bivariate analyses, it was not included in the multivariable model to preserve model stability and parsimony. Given the relatively small proportion of participants with lower education ($n = 24$, 10.2%) and the need to prioritize more proximal behavioral variables within the constraints of a limited number of outcome events, its inclusion may have resulted in unstable estimates and increased the risk of overfitting, thereby contributing to residual confounding. The cross-sectional design precludes causal inferences and limits the ability to determine the temporal direction of the observed associations. The relatively high internal consistency coefficients observed for the PGSI in this sample (Cronbach's α and McDonald's $\omega = 0.95$) should be interpreted with caution, as the high proportion of zero scores may reflect a floor effect and reduced variability rather than solely indicating strong reliability. In addition, self-reported data are subject to social desirability bias and potential underreporting, particularly in stigmatized domains such as gambling. Finally, the single-center design may limit the generalizability of the findings. Nevertheless, by focusing on healthcare workers and examining digital gambling access alongside co-occurring risk behaviors from an occupational health perspective, the present study provides valuable insights.

CONCLUSION

In conclusion, this study enhances the visibility of at-risk/problem gambling among HCWs and contributes to informing institution-based screening and prevention initiatives, particularly in the context of digital gambling accessibility. Strategies that extend beyond severe cases to include early screening and low-intensity interventions targeting a broader risk pool may be more effective in reducing overall harm. Future research employing longitudinal designs and incorporating more detailed psychosocial variables (e.g., stress, burnout, depression/anxiety, impulsivity) would help clarify the mechanisms underlying these associations.

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