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The Prevalence of Gambling among University Students in Central and Southern Iran

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Abstract: We aimed to estimate the last-year prevalence of gambling among students of medical sciences universities in the south of Iran. A sample of 1089 students was drawn from three prominent medical universities in southern Iran: Kerman, Shiraz, and Yazd. The prevalences were estimated using direct and indirect (Network Scale Up) methods. To calculate the prevalence using both approaches, a survey analysis was conducted. Visibility factors were estimated by calculating the ratio of NSU results to direct estimates. 95% CIs were calculated by a bootstrap procedure. The prevalence of performing any gambling activities during the last year was calculated as 22.24% (95%CI: 19.56%, 25.17%). The highest prevalence of gambling activity among students in both direct and indirect

methods was offline playing cards (such as poker, 21, etc.). The last year prevalence of offline playing cards, as estimated by direct and indirect methods, was 10.27% (95%CI: 8.38%, 12.52%) and 9.05% (95%CI: 6.97%, 11.14%), respectively. The visibility factor associated with gambling activities ranged from 0.59 to 0.89, indicating that approximately 11% to 41% of gambling behaviors were not visible to members of students' close social networks. Offline card games were the most prevalent form of gambling among students in the past year. Given the relatively low visibility of student gambling and its potential for significant harm, it is imperative to identify the underlying factors and motivations driving these behaviors. Furthermore, the development and implementation of effective individual and social interventions and programs can mitigate the potential risks and negative consequences of gambling.

Keywords: Gambling, Students, Network Scale Up, Iran.

Introduction

Gambling is the act of wagering or betting money or something of value on an event with an uncertain outcome (Langham et al., 2015). The prevalence and character of gambling activities exhibit significant spatiotemporal variability. Gambling has been a popular pastime in Britain for centuries. In the early 20th century, it was outlawed in almost all of the United States. However, since the end of the 20th century, there has been a softening of legislators' attitudes and a lifting of the ban on various aspects of betting in the USA (Dunstan, 1997). Nevertheless, gambling is illegal in some countries, and some religions, such as Islam, declare it "haram" (forbidden). Gambling is currently strictly prohibited in Iran (Parhami et al., 2012).

The legal and religious prohibition of gambling contributes to its concealment, rendering it a hidden behavior within society. As a result, gambling activities may occur despite relatively low reported prevalence, and empirical evidence in such contexts remains limited. In a recent study in Iran, the prevalence of online gambling was 8.9% (Davoudi et al., 2022).

Gambling among students and, particularly, among highly educated individuals can have more severe social consequences. Research has demonstrated a significant correlation between gambling and the use of drugs and alcohol among student populations (Caldeira et al., 2017). Other studies have demonstrated the relationship between gambling, missing classes, and academic dropout or dismissal. Research indicates that most adult gamblers report that their previous experiences with gambling significantly influenced the development of their current gambling behaviors. These early experiences often begin during young adulthood or university years. The prevalence of this social phenomenon within this demographic can have detrimental consequences, including delinquency and criminal behavior, depression, and even suicidal ideation (Moreira et al., 2023). This issue may be especially salient among medical students,

who experience unique stressors such as intensive academic workloads, emotionally demanding clinical training, and limited opportunities for leisure. These conditions may increase vulnerability to high-risk behaviors, including gambling. Moreover, given their future responsibilities as healthcare professionals, gambling involvement in this group raises particular concern due to its potential long-term implications for both personal well-being and professional functioning (Dowling et al., 2017). Therefore, an investigation into the impact of gambling on student well-being will furnish valuable insights for educational and psychological policymakers.

We employed two distinct methodologies to estimate gambling prevalence: direct assessment and indirect estimation through network scale-up. Estimating the true prevalence of gambling in settings where it is illegal and culturally stigmatized poses substantial methodological challenges. Direct self-report approaches are often compromised by social desirability bias, fear of disclosure, and systematic underreporting of sensitive behaviors (Haghdoost et al., 2018). Although university students constitute well-educated group, they may be especially hesitant to disclose participation in gambling activities due to concerns about possible academic, social, or legal repercussions. Consequently, prevalence estimates based solely on direct questioning are prone to underestimating the actual extent of gambling behaviors. To overcome these shortcomings, indirect estimation techniques—such as the Network Scale-Up (NSU) method—provide a valuable alternative by utilizing individuals' social networks rather than relying on personal disclosure of sensitive behaviors. The NSU method has been shown to be particularly useful for estimating the prevalence of hidden or socially undesirable behaviors in restrictive cultural settings (Ahmadi-Gohari et al., 2019; Gohari et al., 2023; Kazemzadeh et al., 2016; Shokoohi et al., 2012).

One limitation of NSU methods is that respondents often lack information about the sensitive characteristics of their network members (Zamanian et al., 2019). This limitation is known as the visibility factor (VF).

The present study aimed to estimate the one-year prevalence of gambling among students enrolled in three Universities of Medical Sciences in Iran using both direct and indirect (NSU) methods. By applying a dual-method approach, this study sought to cross-validate prevalence estimates and to quantify the visibility factor associated with gambling behaviors in this population.

Methodology

Population

This cross-sectional study was conducted among students enrolled at three universities of medical sciences located in central and southern Iran: Kerman University of Medical Sciences (approximately 5,850 students), Shiraz University of Medical Sciences (approximately 11,000 students),

and Yazd University of Medical Sciences (approximately 5,400 students). The total student population across these institutions was approximately 22,250 in 2023.

Inclusion criteria and sampling procedure

Students were eligible to participate if they had been enrolled at their university for at least one academic year. Participants were recruited using convenience sampling. Trained research assistants approached students in common university settings, including lecture halls before or after classes, campus public areas, and dormitory common spaces. After receiving a brief explanation of the study objectives, voluntary nature of participation, and assurances of anonymity and confidentiality, students who agreed to participate completed the questionnaire.

Based on a previous study reporting an online gambling prevalence of 8.9% (Davoudi et al., 2022), a minimum sample size of 779 participants was calculated using the formula $n = z^2 * [p * (1-p)] / d^2$, with a 95% confidence level and a margin of error of 2%. A total of 1,189 students were recruited using convenience sampling across different faculties. After excluding incomplete questionnaires, data from 1,089 students were retained for analysis. This included 402 students from Kerman University of Medical Sciences, 428 students from Shiraz University of Medical Sciences, and 259 students from Yazd University of Medical Sciences.

Data collection procedure

Data were collected using a self-administered, paper-based questionnaire. Participants completed the questionnaire individually, without the presence of peers or university staff. No identifying information was collected.

Measurement instruments

The questionnaire consisted of two distinct sections, designed to capture gambling prevalence through two conceptually distinct yet complementary approaches.

The first section included direct self-report questions assessing individual participation in ten gambling-related activities not gambling disorder or problem gambling severity during the past year. The gambling activities were (1) offline card games, (2) online card games, (3) sports teams or sports team players, (4) sports teams or players of sports teams online, (5) the games in which dice are used, (6) online games in which dice are used, (7) online computer games, (8) sports activities with others, (9) betting on one's skills with others, and (10) Other methods not specified. These items were adapted from the Persian version of a validated gambling disorder screening tool, which has demonstrated high internal consistency (Cronbach's $\alpha > 0.93$) in previous study (Maarefvand et al., 2017).

The second section applied the NSU method to obtain an alternative population-level estimate of gambling prevalence through

respondents' social networks. Participants were first asked to report the number of close friends, defined as students from the same university whom they knew by name and face and with whom they had frequent face-to-face interactions with several times a week and spend at least two hours (continuous and non-continuous) a week outside of class (Zahedi et al., 2018). They were then asked to report how many of these close friends had engaged in specific gambling activities during the past year. Participants were assured of the confidentiality of their responses.

Importantly, the NSU questions were not intended to measure individual gambling behavior among respondents' friends, but rather to infer population-level prevalence under the assumption that personal networks provide partial proxies of the underlying student population.

Data cleaning

Data cleaning procedures were applied separately for direct and indirect analyses.

Direct method

Participants who reported engaging in gambling activities within the past year but denied any lifetime history of gambling were excluded from the analysis due to response inconsistencies. These exclusions resulted in a final sample size of 892 students: 315 from Kerman University, 369 from Shiraz University, and 208 from Yazd University. Specifically, 87 students from Kerman University, 59 students from Shiraz University, and 51 students from Yazd University were excluded from the analysis.

Indirect method

For the indirect method, respondents who reported having no close friends or provided implausible network sizes were excluded only from NSU-related analyses. These participants were retained in all direct prevalence analyses. The cleaning steps are shown in Figure 1.

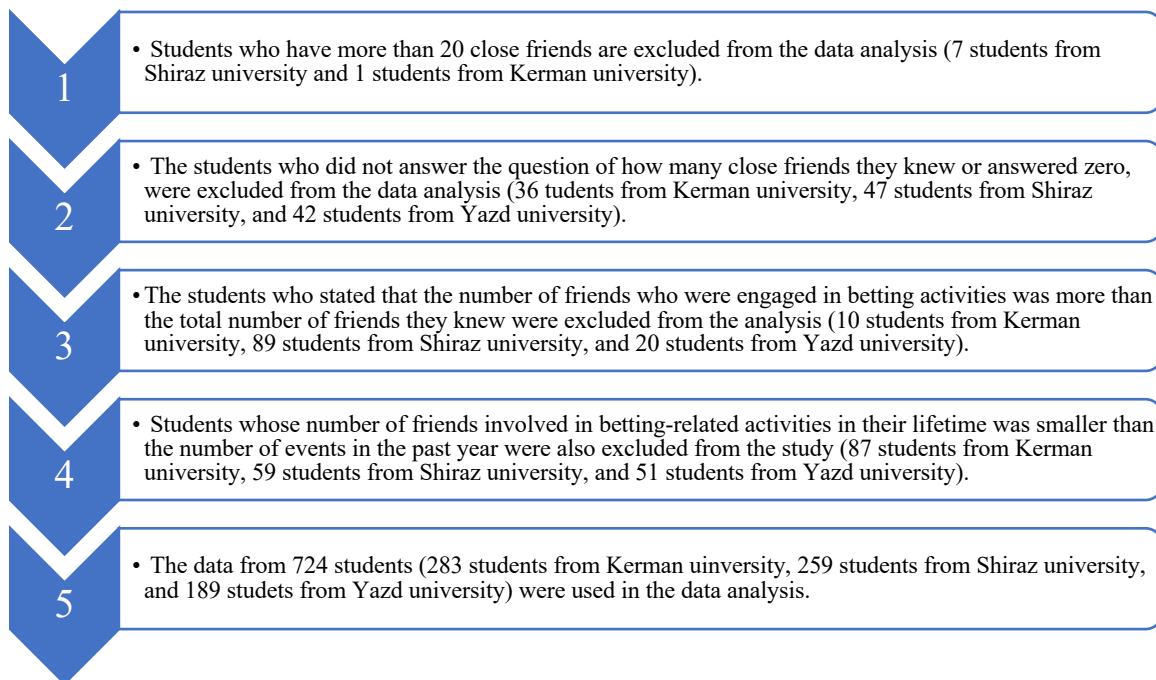


Figure1. Data cleansing steps in the indirect method.

Data analysis

To ensure accurate prevalence estimates using both direct and indirect methods, survey data were analyzed while accounting for the varying student populations across the three universities. Weighting factors were applied to each university based on its total student divided by the sample size selected from that university.

Direct estimation

The first section included a checklist of gambling-related activities. Participants were asked to indicate whether they had engaged in each activity at least once during the past year (yes/no). The list of activities was adapted from previously published instruments to ensure coverage of commonly reported gambling behaviors. In the present study, these items were used solely to identify the types of gambling activities reported by students and to estimate their prevalence. No composite score was calculated, and the items were not intended to measure gambling severity, gambling problems, or gambling disorder. Confidence intervals were estimated using Wald methods.

Indirect estimation (Network Scale Up)

The indirect prevalence of gambling was estimated using the network scale-up method, as follows:

$$e_j = \frac{\sum_i m_{ij}}{\sum_i c_i} \quad (1)$$

Where i ($i = 1, 2, \dots, n$) represents the respondent, j ($j = 1, 2, \dots, J$) shows the gambling activity, e_j shows the estimated value for gambling activity j , m_{ij} is the number of people respondent i knows in group j , and C_i is the network of close friends of respondent i (Shokoohi et al., 2010).

Following the aforementioned equation, the point estimate for each gambling-related activity was derived by dividing the total number of close friends reported by each respondent to have engaged in that activity by the total number of close friends within that respondent's social network. Uncertainty intervals were estimated using the bootstrap resampling method. To achieve this, 10,000 bootstrap samples were drawn, each obtained by randomly sampling from the dataset with replacement, using the same sample size as the original. Subsequently, the prevalence estimates were calculated using Equation 1. Finally, the 2.5th and 97.5th percentiles of the estimated prevalence values were identified as the lower and upper bounds of the uncertainty interval, respectively.

It is important to note that the Network Scale-Up (NSU) method provides an indirect, population-level estimate of gambling prevalence based on participants' social networks. As such, it does not directly measure individual behaviors, and some gambling activities may remain unobserved even among close friends (Tabrizi et al., 2022). The visibility factor therefore reflects the proportion of behaviors not visible within respondents' social networks, rather than the absolute prevalence of hidden gambling. Accordingly, NSU is not designed to validate individual-level gambling behavior; rather, it provides a complementary framework for estimating the visibility (and disclosure) of socially sensitive behaviors within participants' social networks (Haghdoost et al., 2018).

The indirect estimates were not interpreted as individual-level prevalence measures, nor as direct validations of self-reported behavior, but rather as complementary population-level estimates.

Visibility Factor

To assess the extent of incomplete information transmission within social networks, a visibility factor (VF) was calculated as the ratio of the indirect (NSU-based) estimate to the corresponding direct self-reported estimate. In this study, VF was used as an empirical indicator of the degree to which gambling behaviors are visible within students' social networks. Lower VF values indicate greater concealment of gambling activities from close social ties (Gohari et al., 2023).

Weighting procedure

Design weights were applied to account for unequal sampling fractions across the three universities. Each university was assigned a weight equal to the ratio of its total enrolled student population to the number of participants recruited from that institution. No post-stratification

weights based on age or sex were applied. Weighted analyses were used to produce pooled prevalence estimates representative of students enrolled in the three participating universities.

Software

All analytical procedures were performed with R software version 4.3.2. Confidence intervals were calculated based on a 95% confidence level.

Findings

Descriptive findings

A total of 892 students including 341 males (39.7%) and 519 females (60.3%) were examined using the direct method. Moreover, 94 students (11.2%) were married, 249 students (29.4%) lived with their families, 542 students (63.9%) lived in university dormitories, and 57 students (6.7%) lived in private homes. The mean age of the students was 30 ± 10 years and their median age was 22 years. The students' GPA in the previous semester was 16.63 ± 1.97 (out of 20). In addition, 346 (40.5%) of the students reported that their fathers had a diploma or lower education, 310 students (36.2%) reported that their fathers had a diploma to bachelor's degree, and 200 students (23.4%) reported that their fathers had a postgraduate degree.

The prevalence of gambling among students

The direct prevalence of any gambling activities during the last year was calculated as 22.24% (95%CI: 19.56, 25.17). "Online dice games was the least common activities in direct method 4.46% (95%CI: Offline playing cards was the most gambling activity among students that was estimated to be 10.27% (95%CI: 8.38, 12.52) in the direct and 9.05% (95%CI: 6.97, 11.14) in the indirect method. 3.28, 6.04). "Other methods not specified" in indirect methods was the least common activities with 2.94% (95%CI: 1.96, 3.92) (Table1).

Visibility factor of gambling behaviors within social networks

The visibility factor associated with gambling-related behaviors within students' social networks ranged from 0.59 to 0.89. This indicates that between 11% and 41% of gambling-related behaviors within students' social networks may not be observable or disclosed to peers (Table 1).

Table 1. Comparison of direct and indirect prevalence estimates and corresponding visibility factors for gambling-related behaviors

A variety of gambling activities	Direct prevalence (%) (95% CI)	Indirect prevalence (%) (95% CI)	Visibility coefficient
Offline Card games (Such as poker, 21, etc.)	10.27 (8.38, 12.52)	9.05 (6.97, 11.14)	0.88
Online card games	5.90 (4.49, 7.71)	4.52 (3.23, 5.81)	0.77
Sports teams or sports team players	6.88 (5.36, 8.80)	6.06 (4.28, 7.85)	0.88
Sports teams or players of sports teams online	8.57 (6.85, 10.68)	5.57 (4.15, 6.99)	0.65
The games in which dice are used	6.37 (4.93, 8.20)	5.14 (3.74, 6.54)	0.81
Online games in which dice are used	4.46 (3.28, 6.04)	3.88 (2.70, 5.06)	0.87
Online computer games	6.09 (4.68, 7.89)	5.39 (3.83, 6.96)	0.89
Sports activities with others	8.71 (7.01, 10.78)	5.14 (3.82, 6.46)	0.59
Betting on one's skills with others	7.37 (5.80, 9.32)	6.36 (4.57, 8.17)	0.86
Other methods not specified	4.96 (3.67, 6.66)	2.94 (1.96, 3.92)	0.59

Discussion

The findings of this study indicate that gambling participation is not negligible among Iranian university students, with more than one-fifth reporting engagement in at least one form of gambling during the past year. This level of participation is notable given the legal prohibition and strong religious discouragement of gambling in the study context, where such behaviors are socially stigmatized and institutionally restricted (Singer, 2025). These findings suggest that gambling behaviors may still occur among university students despite formal restrictions. Card games and sports-related betting emerged as the most commonly reported gambling activities in this study, which is consistent with previous research indicating that these forms are particularly familiar and accessible among young adults.

A study conducted among English adolescents reported a one-year prevalence rate of gambling at 46% (CENSUSWIDE, March 2024). Another study, conducted in Finland, found that 51.6% of the respondents had gambled within the past year (Castrén et al., 2015). Meanwhile a study conducted among Chinese students reported an annual prevalence of 41.8%, which was substantially higher than the prevalence observed among Iranian students in the present study (Wong et al., 2021).

Several international studies have reported higher annual gambling prevalence than that observed among Iranian students in the present study. For instance, a study among English adolescents reported a one-year prevalence of 46% (CENSUSWIDE, March 2024), a Finnish study found 51.6% of respondents had gambled in the past year (Castrén et al., 2015), and research among Chinese university students reported an annual prevalence of 41.8%, substantially higher than the 22% observed in this study (Wong et al., 2021). These differences may reflect variations in legal frameworks, cultural norms, gambling accessibility, and levels of social acceptability across contexts (Gavriel-Fried et al., 2023).

The observed prevalence is notable given the legal, religious, and social constraints surrounding gambling in this context.

In this study, offline card games were the most prevalent gambling activity among students, with an estimated prevalence of approximately 10% based on both direct and indirect estimation methods. The observed prevalence is notable given the legal, religious, and social constraints surrounding gambling in this context. This is particularly relevant in student populations, where concerns about academic standing, future professional opportunities, and social reputation may further limit willingness to disclose engagement in stigmatized activities. Therefore, the direct prevalence estimates reported in this study should be interpreted as conservative approximations rather than definitive measures of gambling involvement.

Indirect estimates obtained through the NSU method were generally lower than direct self-reports across most gambling activities. It means students do not share their gambling behaviors even with their close friends. In cases where the direct and indirect prevalence results are very close, such as Online computer games, Offline Card games (Such as poker, 21, etc.), Sports teams or sports team players, Online games in which dice are used, Betting on one's skills with others, and the games in which dice are used, this can lead to the ugliness of these behaviors being downplayed in students.

The findings showed activities embedded in informal social settings (such as card games) may be more openly shared, whereas other forms of gambling may remain confined to private or anonymous contexts.

The visibility factors observed for gambling-related behaviors in the present study ranged from 0.59 to 0.89, indicating moderate to relatively high social visibility of these behaviors within student friendship networks. Compared with findings from previous NSU studies on other sensitive behaviors, gambling appeared to be less hidden. For example, one study reported considerably lower visibility factors for pipe use and sedative/hypnotic prescription misuse (0.4 and 0.5, respectively), suggesting that disclosure of these behaviors within social networks was substantially lower (Zahedi et al., 2018). This comparison may indicate that gambling behaviors among university students are relatively more socially observable than some substance-related behaviors, although a considerable

proportion of gambling activities may still remain undisclosed even among close friends.

The findings also underscore the methodological challenges inherent in estimating the prevalence of socially sensitive behaviors in restrictive cultural settings. While direct self-reporting remains a standard approach in prevalence research, it is susceptible to social desirability bias. Indirect methods such as NSU, although subject to their own assumptions and limitations, may offer additional contextual information regarding social visibility and disclosure processes. When interpreted cautiously and descriptively, the combined use of these approaches can enrich understanding of gambling behaviors without implying that one method supersedes the other (Rockloff et al., 2022).

Conclusion

Gambling participation was not uncommon, with offline card games being the most frequently reported activity. Given the illegal and socially sensitive nature of gambling in this context, reliance on self-reported data may underestimate true prevalence. The findings highlight the need for cautious interpretation and underscore the importance of using culturally appropriate methodologies when studying hidden behaviors. Given the relatively low visibility of student gambling and its potential for significant harm, it is imperative to identify the underlying factors and motivations driving these behaviors. Furthermore, the development and implementation of effective individual and social interventions and programs can mitigate the potential risks and negative consequences of gambling.

Limitations and suggestions

Several limitations of this study should be acknowledged. First, gambling behaviors were assessed using a checklist of activities rather than a validated psychometric instrument designed to measure gambling severity or gambling-related problems. Accordingly, the findings reflect the prevalence of self-reported gambling behaviors and should not be interpreted as estimates of gambling disorder or problem gambling.

Second, the study relied on self-reported data, which are subject to underreporting due to social desirability bias and perceived stigma associated with gambling, particularly in cultural and religious contexts where gambling is socially discouraged. Therefore, the true prevalence of gambling behaviors may be higher than reported through direct self-reporting.

Third, the indirect estimates obtained through the Network Scale-Up (NSU) method is influenced by assumptions regarding respondents' awareness of their close friends' behaviors. Limited disclosure within social networks may lead to underestimation of prevalence, a phenomenon commonly referred to as the transparency barrier.

Finally, participants were recruited using convenience sampling from three universities of medical sciences. As a result, the findings are not intended to be generalized to all university students or to the general population and should be interpreted with caution. Future studies should build upon the present findings by employing probability-based sampling methods to enhance the representativeness and generalizability of prevalence estimates. Expanding research to include students from a broader range of academic disciplines and geographic regions would further clarify whether the observed patterns are specific to medical sciences students or reflect more general trends among university populations.

The use of validated, culturally adapted instruments designed to assess both gambling behaviors and gambling-related harm is strongly recommended. Such tools would allow future research to distinguish between occasional gambling, risky patterns, and clinically relevant gambling problems, thereby improving the interpretability of prevalence estimates.

Longitudinal study designs are also warranted to examine trajectories of gambling behaviors over time and to explore potential associations with academic stress, mental health outcomes, and substance use. These approaches would provide insight into temporal relationships that cannot be assessed in cross-sectional studies.

In settings where gambling is socially sensitive, future research may benefit from combining direct and indirect methodologies with qualitative approaches to better understand disclosure practices, social norms, and perceptions of gambling within peer networks. Such mixed-method designs could clarify the mechanisms underlying variability in social visibility and reporting.

STATEMENT OF COMPETING INTERESTS

None declared.

ETHICS APPROVAL

The study protocol was approved by the Ethics Committee of Kerman University of Medical Sciences (IR.KMU.REC.1402.002; approved on 10 April 2023).

RELATIVE CONTRIBUTIONS

Milad Ahmadi Gohari, Saiedeh Haji-Maghsoudi, Mohammad Reza Baneshi, and Yunes Jahani conducted the formal analysis and developed the methodology. Reza Tabrizi, Alireza Dehghani, Farzan Madadzadeh, and Razieh Najafi curated the data. Milad Ahmadi Gohari, Yunes Jahani, Saiedeh Haji-Maghsoudi, and Mohammad Reza Baneshi contributed to the investigation, validation, and software development. Yunes Jahani was responsible for project administration, supervision, and resource management. Milad Ahmadi Gohari and Yunes Jahani contributed to visualization. Milad Ahmadi Gohari, Yunes Jahani, and Maryam Chegeni

wrote the original draft. All authors reviewed and approved the final version of the manuscript.

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RESEARCH PROMOTION

Gambling among university students is an important but potentially underrecognized public health concern, particularly because some gambling behaviors may remain hidden from students' close social networks. In this study of 1,089 medical sciences students in southern Iran, 22.24% reported engaging in gambling during the previous year, with offline card games being the most common form of gambling. The findings also indicated limited visibility of gambling behaviors within students' social networks, highlighting the need for greater attention to the underlying drivers of gambling and the development of effective prevention and intervention strategies.

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