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Cutting the odds: Understanding non-suicidal self-injury patterns among people gambling online

Magda Losaberidze [a,b], Róbert Urbán [b,u], Yanisha Soborun [c], Melinda Reinhardt [b], Gyöngyi Kökönyei [b,d,e], Ornella Corazza [f,g], Mark D. Griffiths [h], Rosalind Baker-Frampton [i], Gemma Mestre-Bach [j,k,m], Susana Jiménez-Murcia [k,l,m], Marc N. Potenza [n,o,p,q,r,s], Zsolt Demetrovics [b,c,t,*], Andrea Czakó [b,c,t]

[a] Doctoral School of Psychology, ELTE Eötvös Loránd University, Budapest, Hungary
[b] Institute of Psychology, ELTE Eötvös Loránd University, Budapest, Hungary
[c] Centre of Excellence in Responsible Gaming, University of Gibraltar, Gibraltar, Gibraltar
[d] NAP3.0-SE Neuropsychopharmacology Research Group, Hungarian Brain Research Program, Semmelweis University, Budapest, Hungary
[e] Department of Pharmacodynamics, Pharmaceutical Sciences, Semmelweis University, Budapest, Hungary
[f] Department of Psychology and Cognitive Science, University of Trento, Trento, Italy
[g] Department of Medicine, University of Hertfordshire, UK
[h] Psychology Department, Nottingham Trent University, Nottingham, UK
[i] Gordon Moody, Dudley, UK
[j] Grupo de Investigación en Adicciones Comportamentales, Universidad Internacional de La Rioja, La Rioja, Spain
[k] Department of Clinical Psychology, Bellvitge University Hospital-IDIBELL, Spain
[l] School of Medicine and Health Sciences, University of Barcelona, Barcelona, Spain
[m] Ciber Physiopathology of Obesity and Nutrition (CIBERObn), Instituto de Salud Carlos III, Barcelona, Spain
[n] Department of Psychiatry, Yale University School of Medicine, New Haven, CT, USA
[o] Child Study Center, Yale University School of Medicine, New Haven, CT, USA
[p] Connecticut Mental Health Center, New Haven, CT, USA
[q] Connecticut Council on Problem Gambling, Wethersfield, CT, USA
[r] Department of Neuroscience, Yale University, New Haven, CT, USA
[s] Wu Tsai Institute, Yale University, New Haven, CT, USA
[t] Flinders University Institute for Mental Health and Wellbeing, College of Human Sciences and Culture, Flinders University, Bedford Park, SA, Australia
[u] Department of Psychology, College of Health, Atlántico Medio University, Las Palmas de Gran Canaria, Spain

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ABSTRACT

Background and aims: Non-suicidal self-injury (NSSI) and gambling are considered notable public health challenges, each linked to emotion dysregulation, impulsivity, and heightened mental health risks. Although examined separately, their co-occurrence may reflect overlapping vulnerabilities. The present study examined the prevalence, correlates, and predictors of NSSI among ndividuals who gamble online and identified distinct behavioral subgroups using latent class analysis.

Methods: A cross-sectional study was conducted among individuals with past-year online gambling ($N = 1047$; 50% males; mean age = 39.60 years [SD = 12.46]). Measures included psychometric scales assessing problem-gambling severity, NSSI, impulsivity, sleep difficulties, and psychological distress. Multinomial logistic regressions tested associations between gambling severity and NSSI, and latent class analysis (LCA) was conducted to identify NSSI subgroups. Hierarchical multinomial regressions assessed demographic, gambling-related, and psychological predictors of class membership.

Results: Lifetime NSSI was reported by 64% of participants, with higher odds among those with scores reflecting problem gambling. LCA identified three subgroups: low/no self-harming (61.6%), moderate/occasional self-harming (23.2%), and high/multi-method self-harming (15.2%), reflecting stepwise increases in frequency and method diversity. NSSI class membership was significantly associated with problem-gambling severity

* Corresponding author at: Flinders University Institute for Mental Health and Wellbeing, College of Human Sciences and Culture, Flinders University, Bedford Park, SA, Australia.
E-mail address: zsolt.demetrovics@gmail.com (Z. Demetrovics).

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($\chi^2[3] = 45.0$, $p < .001$). Younger age, insomnia, impulsivity, and psychological distress predicted higher NSSI class membership, with insomnia and distress emerging as the strongest independent predictors.
Conclusion: NSSI is a prevalent and clinically significant correlate of online gambling, emerging even at lower levels of problem-gambling severity, underscoring the importance of integrating emotion regulation and distress-focused support into interventions targeting problem gambling. The study's findings deepen the understanding of psychological pathways linking gambling and self-injury among adults.

1. Introduction

The availability of and participation in gambling have increased markedly during the past three decades [1]. The global betting market is projected to reach nearly $700 billion (US) by 2028 [2], with online gambling growing markedly due to technological innovations [3–6]. This growth has also been accompanied by the normalization of gambling through commercialization and digitization, driven by sponsorship and marketing strategies [7]. Recent findings indicate that 46.2% of adults and more than one in six adolescents have engaged in gambling activities within the past year, with individuals using online platforms demonstrating a particularly elevated likelihood [8]. Gambling disorder affects an estimated 1.2% of the adult population globally [2]. Consequently, problem gambling presents a notable public health concern worldwide.

Gambling-related harms are multifaceted, affecting individuals personally and interpersonally through financial strain, relationship issues, emotional distress, and health problems [9]. Moreover, strong links exist between gambling disorder and mood and anxiety disorders [10,11], insomnia [12], and suicidality [13–15]. However, non-suicidal self-injury has received comparatively little empirical attention [16].

Non-suicidal self-injury (NSSI) is the act by which individuals deliberately damage their own bodies without the intention of ending their lives. NSSI involves behaviors such as cutting, pinching, banging, burning, and carving, among others [17,18]. Prevalence estimates of NSSI vary considerably, ranging between 11.5% and 33.8% depending on sample characteristics and study methodology, with evidence indicating a rising global trend, including in developing countries [19]. This upward trend has become even more pronounced since the pandemic, particularly among young people [20] and other vulnerable groups [21]. The high prevalence of NSSI has prompted ongoing debates about whether it should be recognized as a distinct disorder and has highlighted a need for further research [22–24].

The two-factor model by Klonsky et al. [25] is foundational in NSSI research and has been widely used to understand functions underlying self-injurious behaviors, conceptualizing NSSI as serving both intrapersonal functions (e.g., emotion regulation, relief from negative affect) and interpersonal functions (e.g., communicating distress, peer-bonding). Across all theoretical frameworks, a central and frequent function of NSSI involves affect-regulation. The integrated model of NSSI is considered a promising framework for research and clinical practice [26]. It builds on and unifies the major theories and conceptualizes NSSI as a multifaceted, heterogenous behavior, and considers distal risk factors, proximal intrapersonal factors (e.g., distress tolerance, emotional dysregulation), interpersonal factors (e.g., isolation, deficits in problem-solving), as well as specific vulnerabilities to NSSI (e.g., social learning hypothesis, altered pain perception) [27]. Research has frequently shown that NSSI is associated with impulsivity, depression, anxiety, and difficulties with emotion regulation [28,29]. Persistent insomnia among adolescents is also associated with NSSI, with both linked to each other over time [30,31]. Prior research has associated NSSI with behavioral addictions and addictive behaviors, such as gaming disorder [32–34] and problematic use of the internet [35,36], respectively.

Among Chinese adolescents, both substance and non-substance addictions have been correlated with NSSI [37]. NSSI may share core features with addictive behaviors—such as craving, escalating severity, relief after the act, and compulsive engagement—raising the possibility that it may be better conceptualized within an addiction framework [38,39], particularly in cases of repetitive and poorly controlled NSSI. This subgroup of individuals may engage in NSSI not for coping with emotional distress but rather, for example, for sensation-seeking functions. This can escalate, reoccur, and become persistent, repetitive behavior despite negative consequences [40]. Neuroimaging studies also point to addiction-like mechanisms because individuals engaging in NSSI show altered reward-related brain activations [41]. Neural sensitivity to reward has been associated with NSSI thoughts in early adolescence [42], suggesting the involvement of neural reward circuits resembling those in substance and behavioral addictions. However, researchers note the heterogeneity of NSSI and emphasize that unlike initial stages of addictions, negative reinforcement plays a key role in NSSI maintenance rather than positive reinforcement for many individuals [40].

The Interaction of Person-Affect-Cognition-Execution (I-PACE) model serves as an integrative framework for understanding the development and maintenance of addictive behaviors [43,44] and has been applied to NSSI in a Chinese community sample, where emotional dysregulation and behavioral impulsivity mediated and moderated the association between childhood maltreatment and repetitive NSSI, indicating that high levels of both factors may be important risk markers [45]. Moreover, a meta-analysis of 36 studies concluded that subjective experiences, diagnostic criteria, and neurobiological evidence collectively support conceptualizing NSSI as a behavioral addiction, noting parallels with urges/cravings, impaired control, tolerance, and involvement of the reward, endocannabinoid, and opioid systems; emotional dysregulation, loneliness, and self-concealment appear related to its maintenance, mirroring potential mechanisms reported for other behavioral addictions [35]. Zhou et al. [46] identified three profiles of NSSI with addictive features (none, low, and high), with each group demonstrating different risk trajectories and with maladaptive cognitive schemas contributing.

1.1. Gambling and non-suicidal self-injury

Problem gambling and NSSI share common features such as impulsivity, difficulties in emotion regulation, and maladaptive coping strategies [47]. Both may be viewed in terms of emotion dysregulation theory [48,49]. When individuals experience overwhelming stress and lack the resources to cope effectively, they may turn to emotion-focused strategies to reduce psychological discomfort rather than addressing the root cause. In this context, both gambling and NSSI may serve as avoidant coping mechanisms, and gambling may provide a temporary escape or stimulation. At the same time, NSSI may offer relief from emotional numbness or inner tension, ultimately offering short-term relief but reinforcing long-term distress. A recent systematic review reported an association between problem gambling and difficulties in emotion regulation [49], suggesting that distress may maintain gambling via avoidance strategies. Similarly, difficulties in emotion regulation have also been associated with NSSI, which is often used to alleviate negative emotions [17,48,50].

NSSI and gambling, especially problem or harmful gambling, have been associated with suicidality. The association between gambling and suicide has been extensively examined [15]. A recent meta-analysis [14] found that among individuals experiencing gambling-related problems,

the pooled prevalence estimates were 31.6% for lifetime suicidal ideation and 13.2% for lifetime suicide attempts. Similarly, another meta-analysis [13] reported lifetime prevalence estimates of 31% for suicidal ideation and 16% for suicide attempts among individuals meeting criteria for gambling disorder. Among a clinical sample of 4103 patients, 22.9% reported suicidal ideation—higher than rates observed in other behavioral addictions (buying-shopping disorder: 18.4%; compulsive sexual behavior: 18.2%; gaming disorder: 6.1%) [11].

In England, a study reported that approximately 20% of individuals with problem gambling experienced suicidal thoughts within the past year, which is a considerably higher percentage compared to the general population (4.4%). NSSI has been associated with suicidality in both general [29] and psychiatric populations [51]. In one study, among adolescents engaging in NSSI, 70% reported at least one suicide attempt in their lifetime, and 55% reported more than one attempt [52]. Therefore, NSSI represents a particularly critical risk factor for suicide because it is associated with both heightened suicidal desire and increased capability [53].

Although the literature on the association of gambling and suicide is substantial, there is limited research examining the relationship between gambling and NSSI [16], but existing studies suggest a potential link between gambling and NSSI. Gambling has been identified as a significant statistical predictor of NSSI among college students [54]. Moreover, individuals who exhibit self-injurious behavior are more likely to gamble to manage psychological distress, especially through non-strategic forms of casino gambling, which are associated with dissociative states [55]. Additionally, it was reported that adults with a history of self-injury were more likely to exhibit multi-activity or casino/sports gambling, characteristics linked to self-harm [56].

The co-occurrence of problem gambling and NSSI may be explained through multiple pathways. Gambling may provoke NSSI through emotional volatility and distress that self-injury may temporarily alleviate. Alternatively, both behaviors may arise from shared etiological factors, including impulsivity, difficulties with emotion regulation, and co-occurring psychiatric concerns, consistent with addiction frameworks such as the I-PACE model [43]. Although the possible causal nature of this co-occurrence requires further investigation, it may involve overlapping mechanisms, suggesting the importance of examining gambling–NSSI co-occurrence [57].

1.2. The present study

Research on the intersection of gambling and NSSI is scarce, with most studies concentrating on adolescents. In contrast, adults, especially individuals with varying levels of problem-gambling severity, are understudied. Additionally, psychological correlates of NSSI in relation to problem-gambling severity have not been examined. Therefore, the present study aimed to extend existing knowledge by (i) estimating the prevalence and frequency of NSSI behaviors among individuals with different problem-gambling severity levels, (ii) exploring psychological and demographic correlates of NSSI, including depression, anxiety, insomnia, impulsivity, age, and sex, (iii) exploring statistical predictors of more severe and frequent NSSI engagement, and (iv) using latent class analysis to delineate subgroups characterized by distinct patterns of NSSI behaviors thereby capturing heterogeneity in NSSI behaviors and their differential associations with gambling severity. The study was undertaken to better understand shared emotional and behavioral pathways linking gambling and NSSI, thereby informing more integrated and targeted prevention and treatment measures [58]. Furthermore, the study focused on online gambling given its rising prevalence and related concerns.

2. Methods

A total of 1047 participants 18 years of age or above from the UK were recruited through an online participant recruitment platform (https://www.prolific.com) using a pre-set screening question to identify individuals who had participated in online gambling activities in the past 12 months (to focus on a growing and accessible form of gambling). Participants completed an anonymous online self-report survey administered via *Qualtrics Research Suite*. They were presented with information regarding the research, including the purpose, confidentiality procedures, and their right to withdraw. Moreover, participants were also provided with a list of mental health resources. Participants received £7 as compensation for their time. The study received research ethics approval from the Research Ethics Committee of the University of Gibraltar (Certificate number: 123/2024/UniGib).

2.1. Measures

2.1.1. Non-suicidal self-injury

The Inventory of Statements About Self-injury (ISAS; [59]) was used to assess NSSI. The ISAS consists of two parts. The first part examines the lifetime history of 12 specific NSSI behaviors (e.g., cutting, scratching, burning, and hitting oneself), as well as the frequency and recency of these behaviors. For each behavior endorsed, participants provided information regarding the number of times in which they had engaged and the last time they had done so. The second part of the ISAS assesses the functions of NSSI, asking participants to rate the importance of different reasons for engaging in self-injury. In the present analyses, only Part 1 was used. This part focuses on the prevalence, frequency, and types of NSSI behaviors. Because this part of the inventory captures distinct behaviors rather than being a unidimensional scale, Cronbach's alpha was not calculated. Behaviors were categorized as occasional (less than ten lifetime episodes) or repetitive (equal or more than ten lifetime episodes), consistent with previous research [60,61]. All analyses reflect lifetime engagement.

2.1.2. Psychological distress

The nine-item Depression Anxiety Stress Scale (DASS-9; [62]) was utilized for the assessment of psychological distress. The scale assesses symptoms of depression, anxiety, and stress. Each item (e.g., *I found myself getting agitated*) is rated using a 4-point Likert scale (0 = *Did not apply to me at all,* 3 = *Applied to me very much or most of the time*). A combined score was calculated by summing all items as a measure of general psychological distress. In the present study, the DASS-9 showed excellent internal consistency ($\alpha = 0.92$).

2.1.3. Sleep difficulties

The eight-item Athens Insomnia Scale (AIS; [63]) was used to assess difficulties with sleep over the past month. Each item (e.g., *How would you rate the total duration of your sleep?*) is rated on a 4-point scale (0 = *absence of sleep/daytime problems*, 3 = *presence of severe sleep/daytime difficulties*). The AIS covers multiple dimensions of sleep, including sleep onset latency, nighttime awakenings, early morning awakenings, sleep satisfaction, daytime sleepiness, daytime functioning capacity, and overall feelings of well-being. In the present study, the AIS demonstrated very good internal consistency ($\alpha = 0.88$).

2.1.4. Problem-gambling severity

The nine-item Problem Gambling Severity Index (PGSI; [64]) was used to assess gambling-related problems and negative consequences experienced. Items (e.g., *Have you felt you might have a problem with gambling?*) are rated on a 4-point scale (0 = *never*, 3 = *almost always*), and the total score categorizes individuals into different levels: non-problem gambling (score of 0), low-risk gambling (1–2), moderate-risk gambling (3–7), and problem gambling (8–27). In the present study, the internal consistency was excellent ($\alpha = 0.93$).

2.1.5. Impulsivity

The 10-item version (BIS-R-21-SF) [65] of the 21-item Revised Barratt Impulsiveness Scale BIS-R-21 [66] was utilized to assess cognitive

impulsivity, behavioral impulsivity, and impatience/restlessness. Each item (e.g., *I am self-controlled*) is assessed on a 4-point Likert scale (1 = *rarely/ never*, 4 = *almost always*). The reverse-coding was applied to Items 1, 4, 7, and 10 to ensure that higher scores represent higher levels of impulsivity. The internal consistency in the present study was very good (α =0.86).

2.1.6. Demographic information

Demographic information, including age, sex, marital status, education level, employment status, and income, was also collected from participants.

2.2. Statistical analysis

To explore the associations between problem-gambling severity and NSSI, a series of analyses were conducted. First, descriptive analyses and multinomial logistic regression models [67] were used to assess the relationship between problem-gambling-severity categories (non-problem, low-risk, moderate-risk, and problem gambling) and individual NSSI behaviors. Frequencies of occasional and repetitive engagement in specific NSSI methods were examined across gambling groups. Multinomial logistic regressions were then performed for each behavior separately, with problem-gambling severity as the predictor and NSSI frequency (none, occasional, repetitive) as the outcome. Non-problem gambling served as the reference group. Multinomial logistic regression models were not estimated for comparisons with very low cell frequencies ($n < 5$) due to unstable parameter estimates.

Second, a latent class analysis (LCA; [68]) was conducted to identify distinct subgroups of participants based on their self-reported NSSI behaviors. Models with increasing numbers of classes were estimated and compared using standard fit indices, including the Akaike Information Criterion (AIC), sample-size adjusted Bayesian Information Criterion (ssaBIC), and the Lo–Mendell–Rubin (LMR) likelihood ratio test [69]. Entropy and average posterior probabilities were also examined to evaluate classification quality. The final class solution was selected based on model fit, parsimony, and interpretability. More specifically, the solution with lower AIC and BIC values and a statistically significant LMR test was retained, indicating improved fit over more parsimonious models. When the LMR test was no longer significant, the more parsimonious model was preferred.

Once latent classes were identified, differences in demographic variables (age, sex), problem-gambling severity, and psychological factors (depression and anxiety, insomnia, impulsivity) were compared across classes using one-way ANOVAs and chi-square tests, as appropriate. Pairwise comparisons and effect sizes (Cohen's *d*) were used to characterize between-class differences. Effect sizes were computed as Cohen's *d* values using the pooled within-group standard deviation (SD).

Finally, a multinomial logistic regression was conducted to examine which demographic, gambling, and psychological variables statistically predicted latent class membership. The low/no self-injury class (see Results section) served as the reference category. A two-step modeling approach was used: in the first step, demographic variables (age, sex) and PGSI scores were entered as predictors; in the second step, psychological variables (depression and anxiety, insomnia, and impulsivity) were added to assess their unique contributions.

All analyses were conducted using *IBM SPSS 28.0* and *Mplus 8.10* [70,71]. A two-tailed significance level of $p < .05$ was used for statistical inference. Given the large number of tests in the behavior-specific multinomial logistic regressions (Table 2), *p*-values from these analyses were additionally adjusted for multiple comparisons using a false discovery rate (FDR) correction with the Benjamini–Hochberg procedure (q = 0.05). FDR correction [72] was applied separately within families of tests corresponding to occasional versus no NSSI and repetitive versus no NSSI. Exact *p*-values are reported in Supplementary Table S1, and FDR-significant effects are shown in Table 2.

3. Results

3.1. Sample characteristics

The mean age of participants was 39.6 years (SD = 12.46), with most falling into the 25–44 years age range. The sex distribution was balanced (50.0% male, 49.6% female, and 0.4% other or preferred not to answer). The sample was geographically and educationally diverse, with most living in towns or cities and 40.6% holding a bachelor's degree. According to the PGSI scores, 37.6% of the participants scored in the non-problem gambling range, 24.8% in the low-risk range, 21.6% in the moderate-risk range, and 16.0% in the range suggestive of problem gambling (M = 3.41, SD = 5.05). The mean AIS score was 7.82 (out of 24; SD = 4.94), with one-third reporting moderate-to-severe insomnia. Psychological distress (DASS-9) averaged 7.02 (out of 27; SD = 5.69), with 13.8% in the moderate-to-severe range. Lifetime NSSI was reported by 64.0% of participants, with an average onset age of 16.3 years (SD = 7.14). See Table 1 for the summary and Supplementary Table S1 for the detailed characteristics of the sample.

3.2. Frequencies and multinomial regression analyses of specific NSSI behaviors by level of problem-gambling severity

Descriptive frequencies showed notable differences in the frequency of NSSI behaviors across problem-gambling-severity groups (see Table 2). For clarity, occasional and repetitive engagement were combined to reflect overall NSSI prevalence. The most reported NSSI behaviors among individuals with PGSI scores suggestive of problem gambling were pinching (36.6%), pulling hair (33.5%), banging or hitting oneself (44.3%), and interfering with wound healing (53.3%). In contrast, these behaviors were significantly less frequent among individuals with non-problem gambling, with rates ranging from 1.3% to 16.0%. When examining NSSI behaviors separately, their prevalence was consistently higher in the moderate-risk and problem-gambling groups compared to the non-problem-gambling group across nearly all behavior types. Notable exceptions included carving, sticking oneself with needles, and other self-injury behaviors, for which the frequencies remained low and did not show a consistent increase with problem-gambling severity.

To evaluate group differences, a series of multinomial logistic regression analyses were conducted to see whether problem-gambling-

Table 1
Sample characteristics and key study variables (N = 1047).

Variable	n (%) / M (SD)
Age (years)	39.60 (12.46)
Sex	
Male	524 (50.0)
Female	519 (49.6)
Other/Prefer not to say	4 (0.4)
PGSI total score	3.41 (5.05)
PGSI gambling category	
Non-problem	394 (37.6)
Low-risk	260 (24.8)
Moderate-risk	226 (21.6)
Problem	167 (16)
AIS insomnia total score	7.82 (4.94)
DASS-9 total score	7.02 (5.69)
Impulsivity score	20.68 (5.20)
Lifetime NSSI engagement	
Never engaged	377 (36.0)
Engaged at least once	670 (64.0)
NSSI onset age (among those who reported NSSI)	16.26 (7.14)

Note. Values are presented as *n* (%) for categorical variables and *M* (SD) for continuous variables; PGSI = Problem Gambling Severity Index; AIS = Athens Insomnia Scale; DASS-9 = Depression, Anxiety, and Stress Scale (9-item); NSSI = Non-suicidal self-injury.

Table 2
NSSI Behavior Frequencies and Associations with Problem-Gambling Severity.

	Frequencies				Multinomial Regression#		
Outcome	Non-problem gambling $N = 394$ n %	Low-risk gambling $N = 260$ n %	Moderate risk gambling $N = 226$ n %	Problem gambling $N = 167$ n %	Low-risk vs. non-problem gambling OR [95% CI]	Moderate-risk vs. non-problem gambling OR [95% CI]	Problem vs. non-problem gambling OR [95% CI]
Cutting							
No use	339 86.0%	197 75.8%	170 75.2%	118 70.7%	Ref.	Ref.	Ref.
Occasional	30 7.6%	38 14.6%	26 11.5%	24 14.4%	**2.18**** [1.31, 3.63]	1.73 [0.99, 3.01]	**2.30**** [1.29, 4.09]
Repetitive	25 6.3%	25 9.6%	30 13.3%	25 15.0%	1.72 [0.96, 3.08]	**2.39**** [1.36, 4.20]	**2.87***** [1.59, 5.20]
Biting							
No use	352 89.3%	212 81.5%	184 81.4%	132 79.0%	Ref.	Ref.	Ref.
Occasional	27 6.9%	28 10.8%	21 9.3%	18 10.8%	1.72 [0.98, 3.01]	1.49 [0.82, 2.70]	1.78 [0.95, 3.34]
Repetitive	15 3.8%	20 7.7%	21 9.3%	17 10.2%	**2.21*** [1.11, 4.41]	**2.68**** [1.35, 5.31]	**3.02**** [1.47, 6.22]
Burning							
No use	376 95.4%	238 91.5%	205 90.7%	141 84.4%	–	–	–
Occasional	13 3.3%	14 5.4%	15 6.6%	18 10.8%	–	–	–
Repetitive	5 1.3%	8 3.1%	6 2.7%	8 4.8%	–	–	–
Carving							
No use	378 95.9%	241 92.7%	207 91.6%	153 91.6%	–	–	–
Occasional	11 2.8%	15 5.8%	16 7.1%	11 6.6%	–	–	–
Repetitive	5 1.3%	4 1.5%	3 1.3%	3 1.8%	–	–	–
Pinching							
No use	331 84.0%	188 72.3%	151 66.8%	106 63.5%	Ref.	Ref.	Ref.
Occasional	30 7.6%	24 9.2%	24 10.6%	23 13.8%	1.41 [0.80, 2.48]	1.75 [0.99, 3.10]	**2.39**** [1.33, 4.30]
Repetitive	33 8.4%	48 18.5%	51 22.6%	38 22.8%	**2.56***** [1.59, 4.13]	**3.39***** [2.10, 5.47]	**3.60***** [2.15, 6.02]
Pulling Hair							
No use	323 82.0%	206 79.2%	168 74.3%	111 66.5%	Ref.	Ref.	Ref.
Occasional	32 8.1%	24 9.2%	24 10.6%	20 12.0%	1.18 [0.67, 2.05]	1.44 [0.82, 2.53]	**1.82*** [1.00, 3.31]
Repetitive	39 9.9%	30 11.5%	34 15.0%	36 21.5%	1.20 [0.73, 2.00]	**1.68*** [1.02, 2.75]	**2.69***** [1.63, 4.44]
Severe Scratching							
No use	330 83.8%	205 78.8%	178 78.8%	115 68.9%	Ref.	Ref.	Ref.
Occasional	28 7.1%	29 11.2%	23 10.2%	17 10.2%	1.67 [0.96, 2.88]	1.52 [0.85, 2.72]	1.74 [0.92, 3.30]
Repetitive	36 9.1%	26 10.0%	25 11.1%	35 21.0%	1.16 [0.68, 1.98]	1.29 [0.75, 2.21]	**2.79***** [1.67, 4.65]
Banging or Hitting Self							
No use	307 77.9%	178 68.5%	126 55.8%	93 55.7%	Ref.	Ref.	Ref.
Occasional	46 11.7%	37 14.2%	44 19.5%	30 18.0%	1.39 [0.87, 2.22]	**2.33***** [1.47, 3.70]	**2.15**** [1.29, 3.60]
Repetitive	41 10.4%	45 17.3%	56 24.8%	44 26.3%	**1.89**** [1.19, 3.00]	**3.33***** [2.12, 5.24]	**3.54***** [2.18, 5.75]
Interfering w/ Wound Healing							
No use	243 62.0%	134 51.5%	130 57.5%	78 46.7%	Ref.	Ref.	Ref.
Occasional	34 8.7%	32 12.3%	20 8.8%	19 11.4%	**1.71*** [1.01, 2.89]	1.10 [0.61, 1.99]	1.74 [0.94, 3.23]
Repetitive	115 29.3%	94 36.2%	76 33.6%	70 41.9%	**1.48*** [1.05, 2.09]	1.24 [0.86, 1.77]	**1.90**** [1.28, 2.81]
Rubbing Skin Against Rough Surface							
No use	361 91.9%	225 86.5%	202 89.4%	136 81.4%	Ref.	Ref.	Ref.
Occasional	11 2.8%	9 3.5%	10 4.4%	13 7.8%	1.31 [0.54, 3.22]	1.63 [0.68, 3.89]	**3.14**** [1.37, 7.17]

(*continued on next page*)

Table 2 (*continued*)

Outcome	Frequencies				Multinomial Regression#		
	Non-problem gambling $N = 394$ n %	Low-risk gambling $N = 260$ n %	Moderate risk gambling $N = 226$ n %	Problem gambling $N = 167$ n %	Low-risk vs. non-problem gambling OR [95% CI]	Moderate-risk vs. non-problem gambling OR [95% CI]	Problem vs. non-problem gambling OR [95% CI]
Repetitive	21 5.3%	26 10.0%	14 6.2%	18 10.7%	**1.99*** [1.09, 3.62]	1.19 [0.59, 2.39]	**2.28*** [1.18, 4.40]
Sticking Self w/ Needles							
No use	382 97.0%	253 97.3%	214 94.7%	155 92.8%	–	–	–
Occasional	8 2.0%	2 0.8%	6 2.7%	10 6.0%	–	–	–
Repetitive	4 1.0%	5 1.9%	6 2.7%	2 1.2%	–	–	–
Swallowing Dangerous Substances							
No use	381 96.7%	246 94.6%	212 93.8%	144 86.2%	–	–	–
Occasional	12 3.0%	12 4.6%	9 4.0%	18 10.8%	–	–	–
Repetitive	1 0.3%	2 0.8%	5 2.2%	5 3.0%	–	–	–
Other							
No use	389 98.7%	257 98.8%	218 96.5%	160 95.8%	–	–	–
Occasional	2 0.5%	1 0.4%	4 1.8%	2 1.2%	–	–	–
Repetitive	3 0.8%	2 0.8%	4 1.8%	5 3.0%	–	–	–

Note. $N = 1047$. Underlined odds ratios (ORs) indicate associations that remained statistically significant after false discovery rate (FDR) correction using the Benjamini–Hochberg procedure (q = 0.05), applied separately within families of tests for occasional versus no NSSI use and repetitive versus no NSSI use. Exact *p*-values are included in the Supplementary materials (Table S4). Multinomial logistic regression models were not calculated for comparisons with very low cell counts (n < 5) due to unstable parameter estimates; these cells are marked by dashes (–).

severity status statistically predicted the likelihood of engaging in specific NSSI behaviors, using the non-problem-gambling group as the reference category. Both occasional and repetitive NSSI were more common among individuals with moderate-risk or problem gambling, although the strength of these associations varied across behaviors and frequency levels (Table 2). The strongest effects were observed for repetitive engagement in behaviors such as pinching, banging or hitting oneself, and burning, where the odds of self-injury were often more than three times higher among individuals with PGSI scores suggestive of problem gambling compared to those with scores in the non-problem-gambling range. These patterns suggest a strong positive association between problem-gambling severity and NSSI frequency.

With regard to moderate-risk gambling, individuals were significantly more likely to report both occasional and repetitive engagement in specific NSSI behaviors compared to individuals in the non-problem-gambling group. The most robust associations emerged for pinching and banging or hitting oneself, where both occasional and repetitive NSSI were more frequent among individuals with moderate-risk gambling, with odds ratios ranging from approximately 2.3 to 3.4. In the case of cutting and pulling hair, only repetitive engagement was significantly more likely among individuals with moderate-risk gambling, while occasional engagement did not reach statistical significance.

At the low-risk gambling level, several NSSI behaviors showed significantly elevated odds compared to the non-problem-gambling group. Specifically, participants in the low-risk group were more likely to report occasional cutting, as well as repetitive engagement in pinching, biting, hitting or banging oneself, interfering with wound healing, and rubbing the skin against rough surfaces compared to the non-problem-gambling group.

3.3. Latent class analysis of NSSI patterns

Model fit statistics supported a three-class solution, which had lower AIC and ssBIC values than the two-class model, along with a significant LMR likelihood ratio test ($p < .001$). Although the four-class model produced slightly better fit indices, the non-significant LMR test ($p = .873$) did not justify choosing the more complex model over the more parsimonious three-class solution. Model fit indices for all tested solutions are reported in Supplementary Table S2. All models demonstrated acceptable classification quality, with entropy values ranging from 0.827 to 0.834, and average posterior probabilities (APPs) per class between 0.85 and 0.96 across models.

The selected three-class model identified qualitatively distinct patterns of NSSI engagement. The largest subgroup (Class 3; *low/no self-injury*, 61.6%) was characterized by minimal or no engagement in any form of NSSI. The second group (Class 2; *moderate engagement/occasional self-injury*, 23.2%) was characterized by low-to-moderate probabilities of engaging in a broad range of NSSI behaviors, predominantly at the occasional level. Behaviors such as pinching, pulling hair, scratching, banging or hitting, and cutting were all engaged in occasionally with probabilities ranging from 0.24 to 0.40, indicating a moderate but diverse self-injury profile. In contrast, repetitive engagement in these behaviors was generally rare, with probabilities mostly below 0.16 across behaviors. Therefore, this class reflected individuals who engaged in self-injury intermittently, across multiple methods, but without habitual or severe repetition. The third and smallest group (Class 1; *high engagement/multi-method self-injury*, 15.2%) was characterized by high probabilities of both occasional and repetitive engagement across multiple NSSI methods. In this group, repetitive engagement was particularly notable for behaviors such as pinching, pulling hair, scratching, banging or hitting oneself, and interfering with wound healing (repetitive engagement probabilities ≥0.49), reflecting a broad and active self-injury repertoire. In contrast, more severe or medically risky behaviors such as swallowing dangerous substances, carving, or sticking with needles remained infrequent even in this group, with repetitive engagement probabilities below 0.10. The three-class solution is shown in Fig. 1, and the full item-response probabilities for each class are reported in Supplementary Table S3.

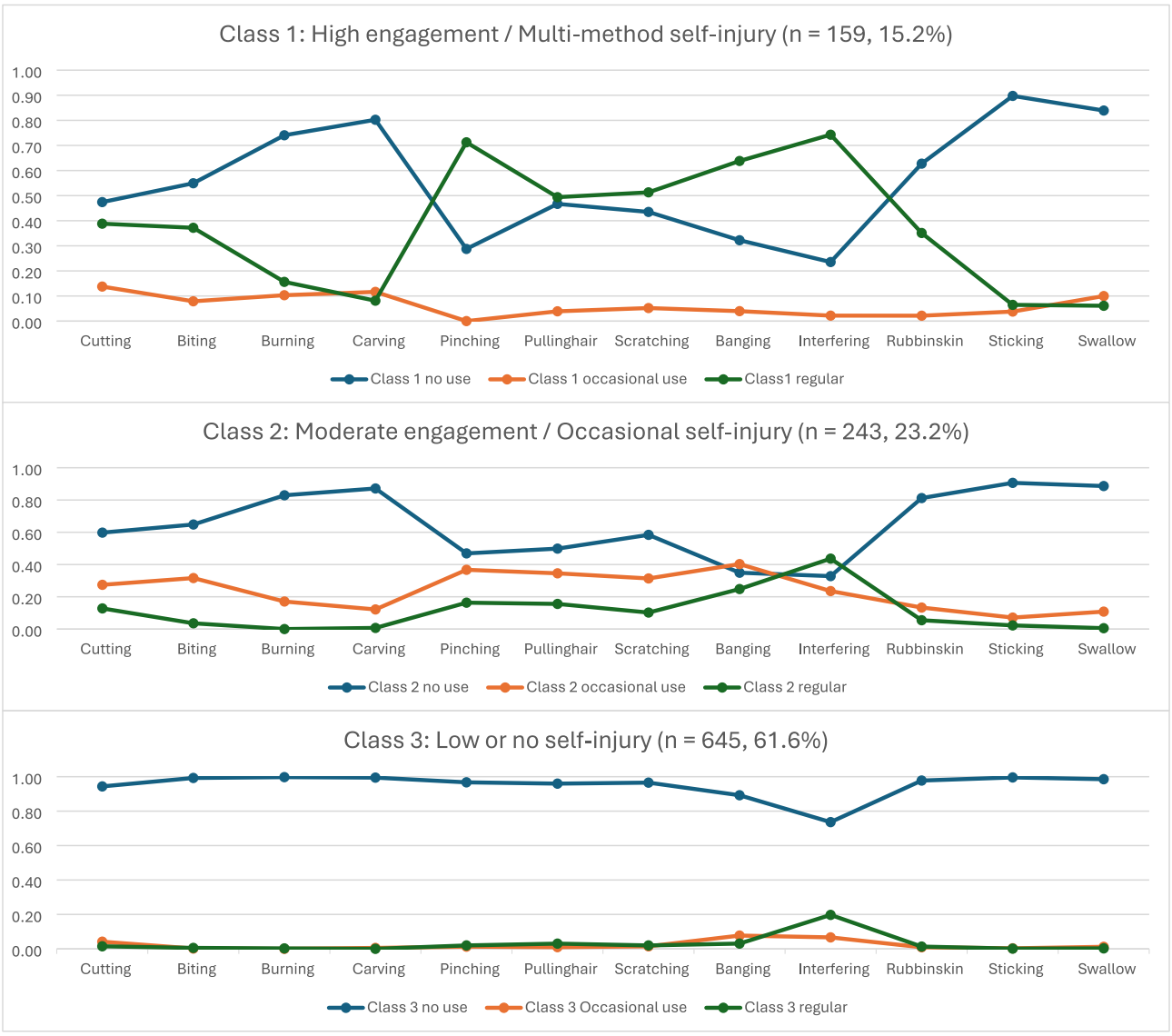

Fig. 1. Latent class-specific probabilities of occasional and repetitive NSSI engagement.
Note: Three classes emerged: Class 3 (61.6%) with minimal/no NSSI; Class 2 (23.2%) with occasional, diverse NSSI behaviors but rare frequent use; and Class 1 (15.2%) showing high probabilities of both occasional and frequent engagement in multiple NSSI methods. Medically severe behaviors were infrequent across all classes.

Mean PGSI scores were highest in the high engagement group, followed by the moderate and low/no self-injury groups (Table 3). Post-hoc comparisons indicated that the high and moderate engagement groups did not differ significantly from one another (Cohen's $d = 0.13$), whereas both groups had significantly higher PGSI scores than the low/no self-injury group (Cohen's $d = 0.54$ and 0.35).

Similar gradients were observed for psychological distress, with the high-engagement group reporting the highest levels of depression, anxiety, stress and insomnia. Post-hoc analyses confirmed that all three latent classes differed significantly from one another on both variables. For depression and anxiety, pairwise comparisons yielded Cohen's d values of 0.44 (high vs. moderate), 1.02 (high vs. low), and 0.57 (moderate vs. low). For insomnia, corresponding Cohen's d values were 0.39, 0.91, and 0.50, respectively. These results indicate a clear stepwise increase in psychological distress across the low, moderate, and high NSSI engagement groups.

Impulsivity also significantly differed across the three groups, showing a stepwise pattern. The high engagement group had the highest impulsivity scores, followed by the moderate group, while the low/no self-injury group scored lowest. Post-hoc comparisons confirmed significant differences between all three groups, with effect sizes of Cohen's $d = 0.26$ (high vs. moderate), 0.68 (high vs. low), and 0.43 (moderate vs. low).

Age also differed significantly across the three latent classes. Individuals in the low/no self-injury group were significantly older than those in the moderate- and high-engagement groups. Post-hoc comparisons indicated moderate effect sizes for the differences between the low group and both moderate- (Cohen's $d = 0.56$) and high-engagement (Cohen's $d = 0.44$) groups, while the high and moderate groups did not differ significantly in age (Cohen's $d = 0.13$).

No significant differences were found between the latent classes in terms of sex distribution. The proportion of females was similar across all three groups, indicating that sex did not differentiate patterns of NSSI engagement in the present sample.

3.4. *Multinomial logistic regression predicting latent class membership*

Table 4 presents the unadjusted associations and four hierarchical

Table 3
Demographic, problem-gambling, and psychological characteristics by latent class membership.

	High engagement/ Multi-method self-injury	Moderate engagement / Occasional self-injury	Low or no self-injury	F/χ^2	*p*
Age, Mean (SD)	36.52a (10.21)	35.12a (10.48)	42.04b (13.02)	35.0	<0.001
Sex n (%) women	78 (49.1)	126 (51.9)	328 (48.8)	2.5	0.871
PGSI score, Mean (SD)	5.10a 5.95	4.31a 6.18	2.65b 4.10	20.9	<0.001
Depression, anxiety (DASS), Mean (SD)	10.89a 5.51	8.51b 5.36	5.50c 5.24	78.1	<0.001
Insomnia, Mean (SD)	10.88a 5.37	8.91b 4.81	6.65c 4.45	60.7	<0.001
Impulsivity (BIS-R-21-SF), Mean (SD)	23.13a 5.42	21.80b 4.83	19.67c 5.00	37.93	<0.001
PGSI categories					
Problem gambling n (%)	39 24.5%	46 18.9%	82 12.7%	45.0	<0.001
Moderate-risk gambling n (%)	41 25.8%	59 24.3%	126 19.5%		
Low-risk gambling n (%)	46 28.9%	67 27.6%	147 22.8%		
Non-problem gambling n (%)	33 20.8%	71 29.2%	290 45.0%		

Note. Class membership was assigned based on the most likely latent class membership. Post-hoc pairwise comparisons were conducted using the Games–Howell test. Means that do not share a common letter differ significantly at $p < .05$.

multinomial logistic regression models predicting latent class membership, with the low/no self-injury class serving as the reference group. In the unadjusted models, each one-year increase in age was associated with a 4%–5% decrease in the odds of belonging to either self-injury class. In addition, higher problem-gambling severity (PGSI), greater impulsivity (BIS-R-21-SF), more severe insomnia (AIS), and elevated psychological distress (DASS) were each significantly associated with increased odds of self-injury class membership. For instance, each additional point on the PGSI was associated with 7%–9% higher odds of higher class membership, and each point increase in insomnia or DASS scores was associated with 11%–20% higher odds. Sex was not a significant predictor.

When age, sex, and problem-gambling severity were entered together (Model 1), younger age and higher PGSI scores remained significant predictors of membership in both self-injury classes (Nagelkerke $R^2 = 11.1\%$). In this model, each one-year decrease in age was associated with a 4%–5% increase in the odds of self-injury class membership. After adding impulsivity (Model 2), BIS-R-21-SF scores emerged as a significant predictor, with each point increase corresponding to 5%–11% higher odds of belonging to a self-injury class. Overall model fit improved (Nagelkerke $R^2 = 14.2\%$). In Model 3, which included insomnia, sleep disturbance emerged as a robust predictor: each point increase in insomnia score was associated with a 7%–17% higher likelihood of belonging to the moderate or high self-injury class. Notably, the effects of problem-gambling severity and impulsivity attenuated and were no longer consistently significant. Model fit increased further (Nagelkerke $R^2 = 19.9\%$).

In the fully adjusted model (Model 4), both insomnia and depressive/

Table 4
Multinomial logistic regression predicting latent class membership based on demographic, problem-gambling, and psychological variables.

	Unadjusted (univariate) models		Hierarchical regression models							
			Model 1		Model 2		Model 3		Model 4	
	Moderate engagement / Occasional self-injury OR [95% CI]	High engagement / Multi-method self-injury OR [95% CI]	Moderate engagement / Occasional self-injury OR [95% CI]	High engagement / Multi-method self-injury OR [95% CI]	Moderate engagement / Occasional self-injury OR [95% CI]	High engagement / Multi-method self-injury OR [95% CI]	Moderate engagement / Occasional self-injury OR [95% CI]	High engagement / Multi-method self-injury OR [95% CI]	Moderate engagement / Occasional self-injury OR [95% CI]	High engagement / Multi-method self-injury OR [95% CI]
Age	**0.95***** [0.94, 0.96]	**0.96***** [0.95, 0.98]	**0.95***** [0.94, 0.96]	**0.96***** [0.95, 0.98]	**0.96***** [0.94, 0.97]	**0.97***** [0.95, 0.99]	**0.95***** [0.94, 0.97]	**0.96***** [0.95, 0.98]	**0.95***** [0.94, 0.97]	**0.97***** [0.95, 0.98]
Sex	1.13 [0.84, 1.52]	1.02 [0.72, 1.44]	1.23 [0.90, 1.68]	1.15 [0.80, 1.65]	1.17 [0.85, 1.60]	1.04 [0.72, 1.51]	1.07 [0.78, 1.47]	0.90 [0.61, 1.32]	1.08 [0.78, 1.48]	0.89 [0.61, 1.32]
PGSI score	**1.07***** [1.04, 1.10]	**1.09***** [1.06, 1.13]	**1.07***** [1.03, 1.10]	**1.09***** [1.05, 1.12]	**1.04*** [1.01, 1.08]	**1.05*** [1.01, 1.09]	1.03 [1.00, 1.07]	1.03 [0.99, 1.07]	1.02 [0.98, 1.05]	1.00 [0.96, 1.04]
Impulsivity (BIS-R-21-SF)	**1.09***** [1.06, 1.12]	**1.14***** [1.10, 1.18]			**1.05**** [1.02, 1.09]	**1.11***** [1.06, 1.15]	1.02 [0.99, 1.06]	**1.05*** [1.00, 1.09]	1.01 [0.97, 1.05]	1.02 [0.98, 1.06]
Insomnia	**1.11***** [1.07, 1.14]	**1.20***** [1.15, 1.24]					**1.09***** [1.05, 1.13]	**1.17***** [1.12, 1.21]	**1.07***** [1.03, 1.11]	**1.12***** [1.07, 1.17]
Depression, anxiety (DASS)	**1.11***** [1.08, 1.14]	**1.20***** [1.16, 1.24]							**1.06**** [1.02, 1.09]	**1.12***** [1.08, 1.17]
Nagelkerke R^2	N/A		11.1%		14.2%		19.9%		22.8%	

Note. Class membership was assigned based on the most likely latent class membership. OR = Odds ratio. CI = confidence interval. Significant ($p < .05$) ORs are boldfaced. N/A: R^2 values not computed for univariate models. *$p < .05$, **$p < .01$, ***$p < .001$.

anxious symptoms remained strong independent predictors of class membership. Each unit increase in DASS score was associated with 6%–12% higher odds of self-injury class membership, even after controlling for all other variables. In contrast, the associations of problem-gambling severity and impulsivity were no longer significant once insomnia and emotional distress were taken into account. The final model showed acceptable explanatory power (Nagelkerke $R^2 = 23\%$).

4. Discussion

To the authors' knowledge, the present study is among the first to explore the relationship between problem-gambling severity and NSSI, integrating frequency estimates, psychological correlates, and latent class patterns of self-injurious behavior. The findings indicated that NSSI was common in this sample, with frequencies substantially exceeding those reported in community-based studies (e.g., [19]). Moreover, the severity and frequency of NSSI varied systematically with levels of problem-gambling severity. Furthermore, NSSI was closely associated with psychological concerns, including depression, anxiety, insomnia, and impulsivity, possibly suggesting shared emotional and behavioral mechanisms linking problem gambling and self-injury. Further investigation is required to better understand the possible shared mechanisms. By documenting these associations, the present study extends prior work that has primarily focused on gambling–suicide associations [14,15,73,74] and builds on a smaller but growing body of research linking problem gambling and NSSI [54–56,75]. The study thereby advances the understanding of the interplay between these behaviors and highlights NSSI as a clinically significant yet relatively understudied correlate of gambling and gambling problems.

In addition to these overall associations, the LCA identified three distinct NSSI subgroups, ranging from minimal to severe engagement. These classes differed systematically in age and psychological distress, with the severe NSSI group being significantly younger and reporting higher levels of psychological distress compared to the low or no NSSI groups. Importantly, impulsivity did not distinguish the classes, suggesting that in this gambling population, psychological distress and difficulties with emotion regulation may be more central than impulsivity in differentiating self-injury risk. These findings are consistent with person-centered research demonstrating heterogeneous NSSI profiles with distinct risk trajectories [46]. They also underscore the value of examining co-occurring concerns through both variable- and person-centered approaches.

The existing literature indicates that globally, NSSI is occurring more frequently among females compared to males [76,77]. Lutz et al. [78] reported that females aged 18–33 years were particularly likely to endorse NSSI, which was attributed to greater psychological distress. Some studies suggest that the sex differences in NSSI prevalence may change with maturation, with differences diminishing by early adulthood. These sex differences appear to be partially related to psychological distress [79]. However, in the present study comprising adults who gamble online, no significant sex differences were found in NSSI class membership. Speculatively, this finding could reflect the older age profile of the participants or the elevated psychological distress levels across both sexes within this gambling population, which could have reduced the potential impact of sex-specific risk factors. It is also plausible that gambling itself may represent such a strong risk factor for NSSI that it overrides sex differences.

After including psychological variables in the model, problem-gambling severity did not remain a significant predictor of NSSI class membership. This suggests that shared underlying vulnerabilities, such as psychological distress, may play a more prominent role than a direct pathway from problem gambling to self-injury. This interpretation aligns with existing conceptual models, including the I-PACE model [43], which emphasize the roles of emotion-regulation difficulties, impulsivity, and distress as potential common mechanisms underlying addictive behaviors.

Consistent with the previous literature, younger age was linked to higher levels of NSSI engagement in the present sample. A review of longitudinal studies [80] showed that NSSI prevalence increases until early adolescence, peaks between age 14 and 16 years, and begins to decline around age 18 years. A recent systematic review and Bayesian meta-analysis also showed that NSSI frequency increases among young adolescents, stabilizes in mid-adolescence, and tends to decline in late adolescence [81]. Some evidence also indicates that ages 18–20 years represent a secondary peak of onset, following the initial emergence in mid-adolescence [82,83]. The present study's findings suggest that this age-related pattern persists even within an adult gambling population, with younger adults engaging in more frequent NSSI compared to their older counterparts. Importantly, the severe NSSI subgroup was significantly younger than the groups reporting little or no NSSI engagement (Cohen's $d = 0.47$), indicating a moderate effect size and underscoring the role of age as a critical factor linked to more severe forms of self-injury.

Impulsivity, a key factor often linked to both gambling and NSSI [84,85] showed a stepwise increase across the latent classes, with the highest scores in the high-engagement group and the lowest in the no/low NSSI group. However, in the multivariable regression analyses, impulsivity no longer predicted class membership once insomnia and emotional distress were included. This suggests that although impulsivity is elevated among individuals with greater NSSI involvement, its statistically predictive role may be largely accounted for by co-occurring affective and sleep-related factors.

Speculatively, impulsivity may contribute indirectly to NSSI risk by undermining self-regulation, promoting persistent gambling, and reducing sleep, thereby exacerbating distress. Moreover, impulsivity may hinder effective problem-solving in response to gambling-related and broader life difficulties, potentially further amplifying emotional distress. In this sense, impulsivity may represent a distal vulnerability factor that facilitates the emergence of proximal risk processes. This interpretation aligns with models such as the I-PACE model [43], which propose impulsivity as a broad vulnerability factor, while the escalation and maintenance of maladaptive behaviors are potentially more directly governed by proximal affective dysregulation and stress-related processes.

Another noteworthy finding was the robust role of insomnia in predicting NSSI class membership. Sleep disturbance remained a significant and independent statistical predictor after controlling for problem-gambling severity, impulsivity, and affective symptoms, suggesting an important role in the co-occurrence between problem gambling and NSSI. Insomnia may heighten NSSI risk through several pathways: by impairing emotion regulation and impulse control, by amplifying negative affect, and/or by reducing the capacity to cope adaptively with stressors. Persistent or increasing sleep problems may increase NSSI risk [30], and insomnia and NSSI may reinforce one another over time via depressive symptoms and emotion dysregulation [31]. Online gambling may also contribute to disrupted sleep [12], through extended nighttime wagering or problem-gambling-related rumination [12,86], thereby creating a vicious cycle in which insomnia may further exacerbate psychological distress and self-injurious tendencies. Clinically, this suggests that insomnia may be a particularly salient and modifiable treatment target. Incorporating sleep-focused interventions, such as cognitive-behavioral therapy for insomnia [87] into prevention and treatment programs for problem gambling may represent an important avenue for reducing self-injury risk. Such an intervention could combine sleep hygiene psychoeducation, emotional regulation (e.g., breathing, relaxation, mindfulness), cognitive restructuring, and behavioral sleep strategies, alongside evidence-based treatments for gambling disorder [88].

Emotional distress also emerged as a robust statistical predictor of NSSI class membership. This finding is consistent with findings that NSSI functions primarily as a maladaptive strategy to regulate negative affect and alleviate acute distress [17,26,50]. Among individuals with

gambling problems, financial losses, shame, and interpersonal conflict may exacerbate depressive and anxious symptoms, which in turn may heighten the risk of self-injury. Therefore, the present study's results support the view that emotional distress may constitute a central mechanism linking problem gambling and NSSI, above and beyond impulsivity or problem-gambling severity *per se*. From a clinical perspective, this suggests the importance of integrating emotion-regulation and distress-tolerance skills into interventions targeting individuals with gambling problems at risk for NSSI.

NSSI may operate as a less effective strategy for emotion regulation. The increased odds of NSSI with higher problem-gambling severity suggests the possibility that both behaviors may reflect attempts to manage psychological distress. A role for emotional distress aligns with emotion regulation theory, which posits that individuals experiencing heightened negative affect are more likely to engage in self-injury as a means of alleviating inner tension or dysphoria. Concurrently, problem gambling may be a source of distress, particularly through losses, debt, and feelings of shame [89–91], which may in turn promote NSSI. Future research using longitudinal or momentary assessments could clarify the temporal sequencing of gambling-related distress and self-injurious behaviors. At the same time, medically severe forms of NSSI remained relatively uncommon, even among individuals with more severe gambling problems, suggesting that while problem-gambling severity may increase the likelihood of engaging in NSSI, it may not necessarily translate into more medically dangerous methods.

These findings have several important clinical and preventive implications. First, because NSSI was elevated even among individuals with low-risk gambling, screening for self-injury should be considered not only in individuals with severe gambling problems but also in those presenting with fewer features of problem gambling. Conversely, assessments of NSSI should include screening for problem-gambling features. Second, the strong role of emotional distress suggests the importance of integrating interventions targeting emotion regulation and stress management into problem-gambling treatment programs, as well as incorporating problem-gambling screening into interventions targeting self-injury. Third, younger individuals with high levels of distress appeared particularly vulnerable for problem-gambling and NSSI, suggesting the need for targeted preventive strategies. Finally, given that NSSI has been implicated as a robust predictor of suicidality [53], the high frequency of NSSI among individuals who gamble, especially those with greater problem-gambling severity, further suggests the clinical significance of addressing this co-occurrence, although suicidality was beyond the scope of the present analyses.

4.1. Strengths and limitations

The present study is subject to several limitations. First, given its cross-sectional design, conclusions regarding causality or temporality between problem-gambling severity, NSSI, and psychological distress cannot be drawn, underscoring the need for longitudinal and momentary assessment approaches in future research. Second, self-report data may have introduced recall and reporting biases. Third, because the sample comprised online gamblers recruited online through *Prolific*, the findings may not generalize to individuals engaged in other forms of gambling or to clinical populations and may have allowed some participants to detect the aims of the study. Fourth, although an anonymous data collection method was employed, it is possible that participants may have underreported or overreported NSSI or other self-reported measures. As such, the findings may not reflect the true prevalence of NSSI or other factors. Fifth, a limited number of psychological/psychiatric features were assessed, and diagnostic assessments were not conducted. Sixth, types of online gambling (sports, slot machine, cards) were not considered. Given the popularity and growth of specific forms of online gambling (e.g., on sports), future studies should consider assessing types and patterns of online gambling more precisely. Seventh, given the large number of behavior-specific tests in Table 2, multiple comparisons were controlled for using an FDR correction (Benjamini–Hochberg, $q = 0.05$; see Supplementary Table S4). Nevertheless, findings from exploratory analyses should be interpreted cautiously. Despite these limitations, the study has several strengths, including a large sample size, the combined use of variable-centered and person-centered analytic approaches, and the incorporation of psychological constructs, including as covariates in analyses. Together, these features provide a more detailed understanding of the complex relationships between problem-gambling severity and NSSI.

4.2. Conclusions and future directions

The present study highlights the complex interplay between problem-gambling severity, psychological distress, and NSSI among adults who gamble online. The findings indicate that even mild online gambling involvement may be associated with self-injurious behavior, suggesting a need for clinical awareness and targeted support that addresses emotional regulation and distress among online gambling populations. Overall, the results contribute to a deeper understanding of the psychological factors linked to NSSI among adults who gamble online. Moreover, co-occurrences with substance use and other psychopathological conditions should also be considered in future studies.

Future research should employ longitudinal and intensive designs, such as experience sampling methods, to clarify the temporal sequencing between types and patterns of gambling, psychological distress, insomnia, and NSSI. Expanding samples to include more diverse and clinical populations could improve generalizability. Further studies could also examine whether gambling and NSSI serve overlapping regulatory functions or act as substitute behaviors, as well as test mediation models to determine more precise roles for impulsivity or emotional distress. In addition, investigating potential protective factors, such as adaptive coping and social support, could also contribute to developing more effective prevention strategies.

Findings of the present study support the need for systematic screening and integrated interventions targeting both problem gambling (of varying severity) and psychological distress, particularly among younger adults. Considering the frequency of NSSI even among individuals with low- and moderate-risk online gambling, clinical assessments should routinely include questions about self-injury, while NSSI-focused interventions should also consider online gambling as a potential concern. Together, these directions suggest the clinical and public health implications of addressing the joint occurrence of online problem-gambling severity and NSSI.

CRediT authorship contribution statement

Magda Losaberidze: Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Róbert Urbán:** Writing – original draft, Visualization, Methodology, Formal analysis, Conceptualization. **Yanisha Soborun:** Writing – review & editing, Project administration, Investigation, Data curation. **Melinda Reinhardt:** Writing – review & editing, Conceptualization. **Gyöngyi Kökönyei:** Writing – review & editing, Conceptualization. **Ornella Corazza:** Writing – review & editing. **Mark D. Griffiths:** Writing – review & editing. **Rosalind Baker-Frampton:** Writing – review & editing. **Gemma Mestre-Bach:** Writing – review & editing. **Susana Jiménez-Murcia:** Writing – review & editing. **Marc N. Potenza:** Writing – review & editing. **Zsolt Demetrovics:** Writing – review & editing, Supervision, Methodology, Investigation, Funding acquisition, Conceptualization. **Andrea Czakó:** Writing – review & editing, Supervision, Project administration, Methodology, Investigation, Conceptualization.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.comppsych.2026.152686.

Data availability

Data supporting the findings of the present study are available upon reasonable request to the corresponding author.

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