



## HEALTH PROMOTION

# The effects of social isolation and problematic social media use on well-being in a sample of young Italian gamblers

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## Keywords

Social isolation • Well-being • Social media • Gambling

## Summary

**Introduction.** Gambling, especially when problematic, has been observed to have a significant impact on mental health, social relationships, and well-being in general. Social isolation and problematic social media use (PSMU) have also been identified as risk factors affecting psychological well-being, with a potential link to gambling that may intensify the impact on well-being, especially among adolescents. However, the interaction between these factors remains poorly explored, especially in younger populations. This study aims to investigate the effects of social isolation and problematic social media use on psychological well-being in a sample of adolescents, focusing on how these factors interact and influence well-being according to different engagement in gambling.

**Methods.** We analyzed data from the 2021/2022 Italian Health Behaviour in School-aged Children study in Tuscany Region. A cross-sectional study was conducted on 1,265 Tuscan adolescents aged 15-17 years, divided into three groups according to gambling behavior: non-gamblers, occasional gamblers and problem gamblers. Participants completed self-report questionnaires to assess well-being, social isolation, and PSMU. Data were analyzed using clustering methods, descriptive statistics, and path analysis to explore the relationships among these variables.

**Results.** The study identified three distinct groups of gamblers: non-gamblers (74.3%), casual gamblers (10.0%) and problem gamblers (15.7%). Contrary to expectations, problem gamblers reported the highest well-being scores, suggesting potential compensatory mechanisms or subjective perceptions masking underlying vulnerabilities. Social isolation had a negative impact on well-being in all groups, with the strongest effects observed in casual gamers. Problematic social media use did not show significant differences between groups, but was associated with lower well-being in all groups. An unexpected positive interaction between social isolation and PSMU was found in problem gamblers, indicating a unique reinforcing relationship in this group.

**Discussion.** The results highlight the complex interaction between gambling behavior, social isolation, and problematic social media use in influencing adolescents' well-being. While social isolation consistently reduced well-being, problematic gamblers showed higher well-being scores, potentially due to developmental factors or maladaptive coping mechanisms.

**Conclusion.** The study emphasizes the need for further research to better understand these relationships, particularly in the context of online gambling and social media use, to provide targeted interventions for at-risk adolescents.

## Introduction

### THE RELATIONSHIP BETWEEN GAMBLING BEHAVIOR AND WELL-BEING

Gambling, in its various forms, has significant and multifaceted effects on well-being, influencing mental health, social relationships, and overall life satisfaction. Studies have shown that individuals with pathological gambling tendencies tend to experience poorer overall well-being compared to those with more moderate or recreational gambling habits [1]. Research highlights that as the severity of problem sports betting increases, so too do mental health symptoms across multiple domains [2]. This may be due to the negative consequences associated with problem gambling, such as financial difficulties, relationship strain, and mental health issues [3].

Conversely, those who engage in gambling at a lower intensity may not experience the same degree of well-being impairment.

Beyond mental health, the negative effects extend to life satisfaction and connectedness, with social functioning showing lower levels as gravity of problematic gambling increases. These findings underscore the pervasive impact of problem gambling on both individual mental health and broader social integration [2].

Among adolescents, problem gambling and gaming share common risk factors, such as low parental monitoring, distrust in societal norms, and male gender. However, distinct pathways to these behaviors also emerge. For gambling, higher approval from peers and family, coupled with lower social support, predicts increased severity, whereas poor family functioning and younger age are more indicative of gaming problems.

Both behaviors correlate with diminished well-being, but problem gaming appears uniquely linked to direct declines in life satisfaction, potentially reflecting its role as a maladaptive coping mechanism [4].

On the contrary, some studies examining broader populations confirm that gambling's effects on well-being are cumulative. Recreational gamblers maintain happiness levels comparable to non-gamblers, suggesting that gambling as a leisure activity does not inherently harm well-being. However, as gambling behavior escalates to "at-risk" or pathological levels, marked reductions in happiness become evident. The transition from social to at-risk gambling corresponds to a sharp 22% drop in well-being, with pathological gamblers exhibiting the lowest life satisfaction. The damage extends beyond financial or legal consequences, encompassing emotional distress, family strain, and social isolation [5].

Taken together, these findings illustrate how gambling behaviors, particularly as they progress into problematic or pathological domains, profoundly disrupt mental health and social well-being. The effects are not limited to immediate psychological distress but also manifest in reduced life satisfaction, diminished connectedness, and impaired social functioning. The most severe consequences, such as heightened anxiety, depression, and loneliness, align with a consistent decline in subjective well-being, as measured by happiness, life satisfaction, and social integration [2, 4, 5].

#### **GAMBLING BEHAVIOR AND SOCIAL ISOLATION**

Social isolation, defined as the lack of meaningful social interactions or connections, has profound effects on psychological and physical well-being. One of the leading theories is Vaux's (1988) Social Support Theory, which emphasizes that social support -- understood as material, psychological and emotional resources available through interactions with other people -- is essential for coping with stressful events. According to this theory, social isolation is considered a risk factor for psychological well-being because it deprives individuals of resources that are essential for coping with stressful situations or for maintaining emotional and psychological balance [6].

The "Tend and Befriend" theory by Taylor et al. [7] highlights the importance of social connections as a natural stress response. When feeling isolated or threatened, the body triggers mechanisms to seek closeness and protection, helping restore emotional balance. Social isolation negatively impacts mental and physical health, increasing anxiety, depression, stress, and reducing life satisfaction [8].

Literature shows how it is associated with increased risks of mental health disorders such as anxiety, depression, and stress, as well as cognitive decline and reduced life expectancy. The absence of social support can exacerbate feelings of loneliness and hopelessness, leading to maladaptive coping mechanisms, such as substance use or addictive behaviors, as individuals attempt to mitigate their emotional distress. Research has consistently

shown that social isolation disrupts emotional regulation and fosters vulnerabilities to compulsive behaviors by weakening the protective effects of interpersonal relationships. These effects are pervasive across different cultural, social, and economic backgrounds, emphasizing the universal importance of social connectedness for overall health and stability [9, 10].

Some studies conducted during the pandemic of COVID-19 show the effects of social isolation on gambling behavior. Social isolation heightened psychological vulnerabilities, such as anxiety, stress, and loneliness, which, in turn, impacted gambling behaviors, particularly among individuals already predisposed to gambling issues. For instance, one study found that men and individuals with prior gambling experiences reported higher gambling scores during the pandemic, with no significant correlation between psychological stress and gambling behaviors, suggesting that pre-existing gambling tendencies played a more critical role than the direct effects of isolation [11]. A longitudinal study in Sweden similarly showed that worries about mental health during the pandemic significantly increased gambling frequency and gambling problems, particularly in high-risk games like online casinos, indicating that psychological distress amplified problematic gambling among vulnerable populations [12]. Cultural differences were also observed, as loneliness in Finland strongly correlated with excessive gambling and participation in online gambling communities, whereas in the U.S., gambling behaviors were less influenced by isolation and more by individual gambling tendencies [11, 12].

Gambling can impact social connections, with problematic gamblers often feeling more isolated and perceiving less support from family and friends due to preoccupation with gambling, social withdrawal, and relationship issues. Conversely, those with controlled gambling tend to maintain stronger social ties, reducing negative social effects [3].

These findings collectively demonstrate that social isolation exacerbates gambling behaviors indirectly by intensifying psychological vulnerabilities and emotional distress, rather than acting as a direct trigger, particularly in high-risk populations and cultural contexts [11, 12].

#### **GAMBLING BEHAVIOR AND PATHOLOGICAL SOCIAL MEDIA USE**

The rise of digital technologies, including social media, has also been linked to the development of problematic gambling behaviors, particularly among younger populations [13]. Modern digital environments foster addictive tendencies by offering constant engagement, reinforcing impulsive behavior, and exposing users to emotionally charged content. These dynamics have significant psychological effects, including increased emotional distress, impulsivity, and vulnerability to compulsive behaviors such as gambling. This interplay is further intensified by overlapping risk factors that exacerbate these issues and create a self-reinforcing cycle of maladaptive behavior. Individuals with pathological gambling tendencies may exhibit increased engagement

in social media platforms, potentially using these digital spaces as a means of coping with or escaping from the negative consequences of their gambling activities [14]. One study by Akbari et al., using latent profile analysis, identified distinct clusters of problematic social media users and demonstrated their links to gambling and well-being. High-risk individuals for PSMU were found to be more likely to engage in problematic gambling behaviors, with these behaviors linked to low levels of emotional well-being and increased social isolation. Social media often serves as a medium through which gambling behaviors are intensified, either by fostering easy access to betting opportunities or by promoting gambling advertisements, which capitalize on the same emotional vulnerabilities fueling excessive social media use. Individuals engaging heavily in both PSMU and gambling often exhibited elevated symptoms of anxiety, depression, and diminished self-esteem. These psychological impacts are not isolated but interrelated; problematic social media use creates emotional distress that can drive individuals toward gambling for short-term relief, while gambling, in turn, leads to further stress and emotional dysregulation. The cyclical and reciprocal nature of these behaviors underscores their deeply rooted connections within the broader spectrum of compulsive and addictive tendencies [15, 16].

Similarly, Tullett-Prado et al. [17] delved into the psychological mechanisms behind PSMU and its ties to gambling and found a cyclical relationship wherein excessive social media use escalates impulsivity, social disconnection, and emotional distress, driving individuals toward gambling as a form of escapism or emotional regulation. In turn, gambling behaviors exacerbated these emotional challenges, creating a self-reinforcing feedback loop. The findings underline that these intertwined behaviors lead to a host of negative outcomes, including diminished self-regulation and compounding emotional stress.

Moreover, research shows that emotions such as guilt, shame, and impulsive reactions frequently found in posts were strong predictors of gambling problems. The researchers leveraged machine learning models like EmoBERTa to detect these emotional indicators, finding that the evolution of emotional states over time provided critical insights into gambling behaviors. Furthermore, social media itself can act as a catalyst for these emotions, intensifying negative feelings through exposure to curated and emotionally charged content, which may escalate gambling behaviors as a form of escapism or coping mechanism [16].

In summary, problematic social media use and gambling behaviors are intricately linked, both influencing and amplifying one another. Their interplay is characterized by shared psychological vulnerabilities, reinforced through digital environments that exploit emotional triggers and impulsivity.

Also, social isolation and problematic social media use emerge as interconnected factors that may significantly influence susceptibility to problem gambling. Social isolation, described as the reduction or absence of

meaningful relationships, deprives individuals of the social support needed to cope with stressful events and reduces psychological resilience [6]. This lack of connection can lead to a search for compensatory alternatives, such as gambling, which offers a sense of stimulation, belonging, and immediate reward. However, gambling, often accessed through online platforms, can exacerbate isolation and reinforce a vicious cycle of social alienation and behavioral addiction [18].

Similarly, problematic social media use, characterized by compulsivity and loss of control, shares many similarities with problem gambling in terms of underlying mechanisms. Both behaviors are driven by dopaminergic reward mechanisms that incentivize repetitive use despite negative consequences [19]. The pervasive and highly addictive nature of social platforms and gambling apps makes individuals already predisposed to isolation or addiction particularly vulnerable. Problematic use of social media can act as a gateway to online gambling, particularly through social games with microtransaction or virtual betting components that often mask traditional gambling mechanisms [20].

In addition, negative emotions such as anxiety and depression, compounded by social isolation or problematic social use, have been shown to contribute to pathological gambling as an escapism or emotional regulation strategy [21]. People who are isolated or dissatisfied with real social relationships may be driven toward gambling activities to feel temporarily more connected, gaining positive reinforcement in the short term but at the cost of worsening mental and financial health in the long term.

Despite what emerges from the literature, it is observed that there are currently no studies defining the relationship between well-being, social isolation, pathological use of social media and gambling.

This cross-sectional study focuses on the impact of digital and relational dynamics on individual well-being. The research stems from the observation that social isolation and social media use can significantly influence our psychological state, with consequences varying depending on personal contexts. The primary objective is to understand how social isolation and problematic social media use interact and influence psychological well-being. Researchers aim to explore the complex relationships between these factors, going beyond simple direct effect measurements to investigate more subtle and hidden interactions.

## Methods

### PARTICIPANTS

A total of 1,265 Tuscany students aged between 15 and 17 years took part in the study. Data were collected during 2022, within the Health Behaviour in School-aged Children (HBSC) survey, a WHO collaborative cross-national study of adolescent health and well-being. Data collection involved the recruitment of a two-stage stratified sample of classes and grade levels that

represent the regional, economic, and public-private distribution of schools in Italy [22, 23]. Before data collection, students' parents received an information note describing the survey's purpose. Families could deny participation by filling in and returning the note to the teachers in each class involved. The study was conducted according to the guidelines of the Declaration of Helsinki. In 2022, the Italian HBSC study protocol and questionnaire were formally approved by the Ethics Committee of the Italian National Institute of Health (Ref. PROT-PRE876/17, 20 November 2017). According to the WHO classification, the majority of the population (82.9%) fell into the normal weight category, while a smaller percentage was classified as overweight (12.1%) or obese (2.8%), together accounting for about 15% of the population. Lastly a very few individuals were underweight, comprising just 2.1%.

### PROCEDURES AND MATERIALS

Participants were asked to fill out a self-report questionnaire aimed at assessing a wide range of topics related to health behaviors in young people. This study considered only a small part of the information collected with HBSC: in particular, data about well-being, level of social isolation, presence of problematic social media use, and finally, gambling. Few demographic information were also considered: age, gender, and Body Mass Index (BMI).

To explore the presence or absence of gambling behavior in the past year and lifetime, 2 items on a 7-point Likert scale were used, where scores were as follows 1 = never; 2 = 1-2 times; 3 = 3-5 times; 4 = 6-9 times; 5 = 10-19 times; 6 = 20-39 times; 7 = 40 times and more.

Additionally, two dichotomous questions from the Lie/Bet questionnaire (Johnson et al., 1998) were used to analyze gambling behavior: the first explained the lying behavior, and the second expressed the need to bet more. To assess well-being, the WHO Well-being Index [24] was used, which explores positive moods, vitality, and general interests. This instrument consists of 5 items on a 6-point likert scale from 0-5 where 0 indicates "at no time" and 5 indicates "all the time".

Next, four items were introduced to assess social isolation, specifically feelings of exclusion and isolation and lack of companionship. Responses are distributed on a 5-point Likert scale where 1 indicates "never" and 5 indicates "always". The Cronbach's Alpha resulting from the analysis was 0.883.

Finally, pathological social media use was assessed using the Italian version of the Social Media Disorder scale [25]. Respondents were asked to answer Yes or No to nine items referring to addiction-like symptoms experienced in the past 12 months (*i.e.*, salience, tolerance, withdrawal, persistence, conflict, escape, deception, problems in important life domains and displacement of activities).

### ANALYSIS

First, descriptive analyses were conducted on the study sample to summarise data. Subsequently, the four

questions related to gambling behavior were analysed by a clustering method (TwoStep), which provided the participant's profile according to the levels of gambling presented. A non-parametric test (Kruskal-Wallis) was used to compare the levels of well-being, social isolation and pathological social media use among the clusters. Finally, a path analysis was conducted to determine the effect of the relationships between social isolation and problematic social media use on well-being in the three population clusters resulting from the analysis above. Analyses were conducted using SPSS and Jamovi 2.6.2 software. The level of significance was set at  $p < 0.05$ .

## Results

A total of 1,265 Tuscany students aged between 15 and 17 years took part in the study. The mean age of the sample was 16 years ( $sd = 1$ ). Of these, the majority were female (51.7%) and the remainder were male (48.3%). According to the WHO classification, the majority of the population (82.9%) fell into the normal weight category, while a smaller percentage was classified as overweight (12.1%) or obese (2.8%), together accounting for about 15% of the population. Lastly very few individuals were underweight, comprising just 2.1%.

Three groups of participants emerged from the analysis of gambling behavior, which differed in terms of patterns and levels of gambling behavior (Tab. I). Cluster 1, which comprises the largest group (74.3%,  $n = 940$ ), is characterized by individuals who reported no gambling activity either in their lifetime or in the past 12 months. This group also does not show dysfunctional behaviors related to gambling, such as lying or the need to bet more. Cluster 2, representing 10.0% of the sample ( $n = 127$ ), includes individuals with minimal involvement in gambling, all of whom reported 1-2 gambling occasions in their lives. In the past 12 months, 46.5% of this group gambled 1-2 times, while the remaining 53.5% reported no gambling activity. Again, subjects in this group denied in all cases that they had lied about gambling or felt the need to bet more, indicating limited and potentially recreational gambling activity with no signs of problem behavior.

In contrast, Cluster 3 (15.7%,  $n = 198$ ) showed more frequent and potentially problematic gambling behaviors. Lifetime gambling activity in this cluster was significantly higher, with 32.8% reporting having gambled 3-5 times, 16.2% reporting having gambled 6-9 times, and 14.6% reporting having gambled 40 times or more. Gambling behavior in the past 12 months followed a similar pattern, with 27.3% playing 1-2 times, 22.2% playing 3-5 times, and 9.1% playing 40 times or more. In addition, 12.6% of individuals in this cluster admitted to lying about their gambling behavior and 16.2% reported feeling the need to bet more, indicating psychological and behavioral patterns often associated with gambling problems. These results highlight the heterogeneity of gambling behavior in the sample, with Cluster 3 representing the highest risk group for gambling related problems.

Tab. I. Differences between the three clusters in relation to gambling behavior.

		Cluster 1 N (%)	Cluster 2 N (%)	Cluster 3 N (%)	Total N (%)
Lifetime	Never	940 (100.0)	0 (0.0)	0 (0.0)	940 (74.3)
	1-2 times	0 (0.0)	127 (100.0)	12 (6.1)	139 (11.0)
	3-5 times	0 (0.0)	0 (0.0)	65 (32.8)	65 (5.1)
	6-9 times	0 (0.0)	0 (0.0)	32 (16.2)	32 (2.5)
	10-19 times	0 (0.0)	0 (0.0)	35 (17.7)	35 (2.8)
	20-39 times	0 (0.0)	0 (0.0)	25 (12.6)	25 (2.0)
	40 times or more	0 (0.0)	0 (0.0)	29 (14.6)	29 (2.3)
Total		940 (100.0)	127 (100.0)	198 (100.0)	1265 (100.0)
Last 12 months	Never	940 (100.0)	68 (53.5)	16 (8.1)	1024 (81)
	1-2 times	0 (0.0)	59 (46.5)	54 (27.3)	113 (9)
	3-5 times	0 (0.0)	0 (0.0)	44 (22.2)	44 (3.5)
	6-9 times	0 (0.0)	0 (0.0)	23 (11.6)	23 (1.8)
	10-19 times	0 (0.0)	0 (0.0)	23 (11.6)	23 (1.8)
	20-39 times	0 (0.0)	0 (0.0)	20 (10.1)	20 (1.6)
	40 times or more	0 (0.0)	0 (0.0)	18 (9.1)	18 (1.4)
Total		940 (100.0)	127 (100.0)	198 (100.0)	1265 (100.0)
Lying behaviour	No	940 (100.0)	127 (100.0)	173 (87.4)	1240 (98.0)
	Yes	0 (0.0)	0 (0.0)	25 (12.6)	25 (2.0)
Total		940 (100.0)	127 (100.0)	198 (100.0)	1265 (100.0)
Need to bet more	No	940 (100.0)	127 (100.0)	166 (83.8)	1233 (97.5)
	Yes	0 (0.0)	0 (0.0)	32 (16.2)	32 (2.5)
Total		940 (100.0)	127 (100.0)	198 (100.0)	1265 (100.0)

Tab. II. Comparison of the three clusters among the measurement scales.

	Cluster 1		Cluster 2		Cluster 3		Test statistic*	p
	Mdn (IQR)	M (sd)	Mdn (IQR)	M (sd)	Mdn (IQR)	M (sd)		
Well-being	48 (32)	48.36 (20.48)	52 (28)	51.50 (19.53)	54 (20)	54.93 (16.22)	18.806	0.000
Social isolation	8 (6)	8.87 (3.88)	8 (6)	8.51 (3.48)	7 (6)	7.62 (3.49)	18.582	0.000
Pathological social media use	2 (4)	2.47 (2.44)	2 (3)	2.35 (2.04)	2 (4)	2.22 (2.16)	1.934	0.380

\* Two-tails Kruskal-Wallis test

In conclusion, we can state that the data reveal that cluster 1 represents individuals who abstain from gambling or engage in it to a minimal extent, without showing signs of problem behavior. Cluster 2 shows limited gambling activity in which the first signs of risk may emerge. Finally, Cluster 3 emerges as the most at-risk group, with a considerable proportion of problem gambling-associated behavior, such as dishonesty and the urge to gamble more.

Table II compares the scores of the three scales (well-being, social isolation, and problematic social media use) among the three student groups.

The data indicate a gradual improvement in well-being between clusters, with statistically significant differences between them ( $p = 0.000$ ). Subjects in Cluster 1 show lower wellbeing scores (Mdn = 48;  $M = 48.36$ ;  $sd = 20.48$ ), suggesting that this group may have issues that affect general wellbeing.

Looking at Cluster 2 we note a slight improvement (Mdn = 52;  $M = 51.50$ ;  $sd = 19.53$ ), indicating moderate levels of well-being. Finally, subjects in Cluster 3, the most at-risk group, report the highest well-being

scores (Mdn = 54;  $M = 54.93$ ;  $sd = 16.22$ ), which could suggest the presence of compensatory mechanisms or a subjective perception of well-being disguising underlying vulnerabilities.

With regard to social isolation, the scores also differ significantly between the clusters ( $p = 0.000$ ), with Cluster 3 reporting the lowest levels of social isolation, (Mdn = 7;  $M = 7.62$ ;  $sd = 3.49$ ) despite being at high risk for gambling. Contrary to what is reported in the literature, the data show that Cluster 1, *i.e.*, those at lower risk or with no gambling, show higher scores on the social isolation rating scale (Mdn = 8;  $M = 8.87$ ;  $sd = 3.88$ ). This paradox might reflect stronger social ties or specific gambling-related social dynamics that are established when the person engages in gambling, whether in presence or online.

Lastly, the data on pathological use of social media show that there are no statistically significant differences between the groups ( $p = 0.380$ ), suggesting similar levels of use in all three clusters.

Interesting results can be observed from the path analysis, which show some differences with the data

Fig. 1. Effect of social isolation and problematic social media use on wellbeing for Cluster 1.

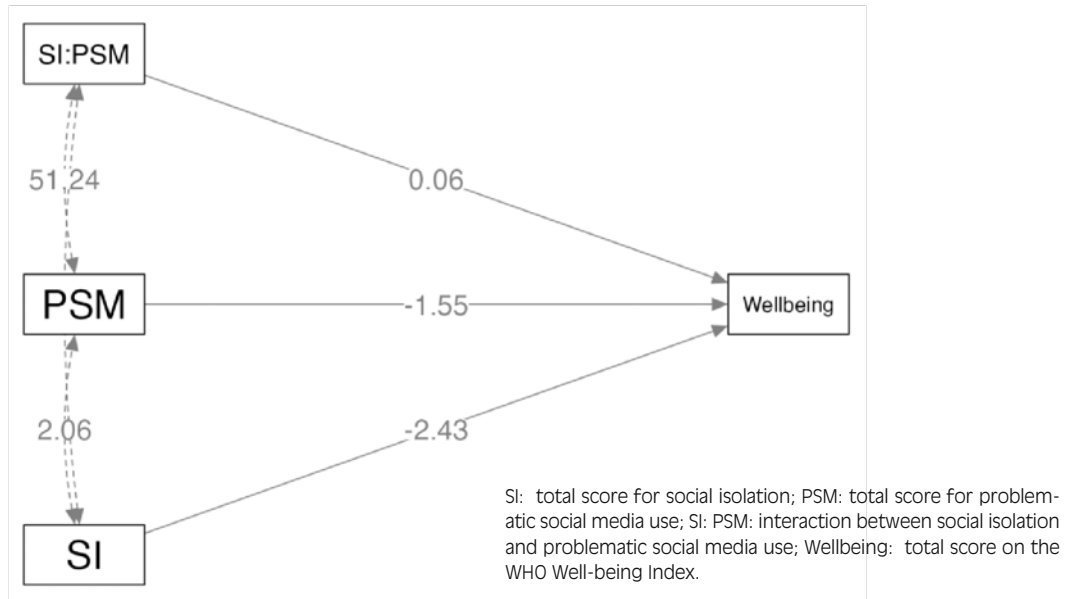
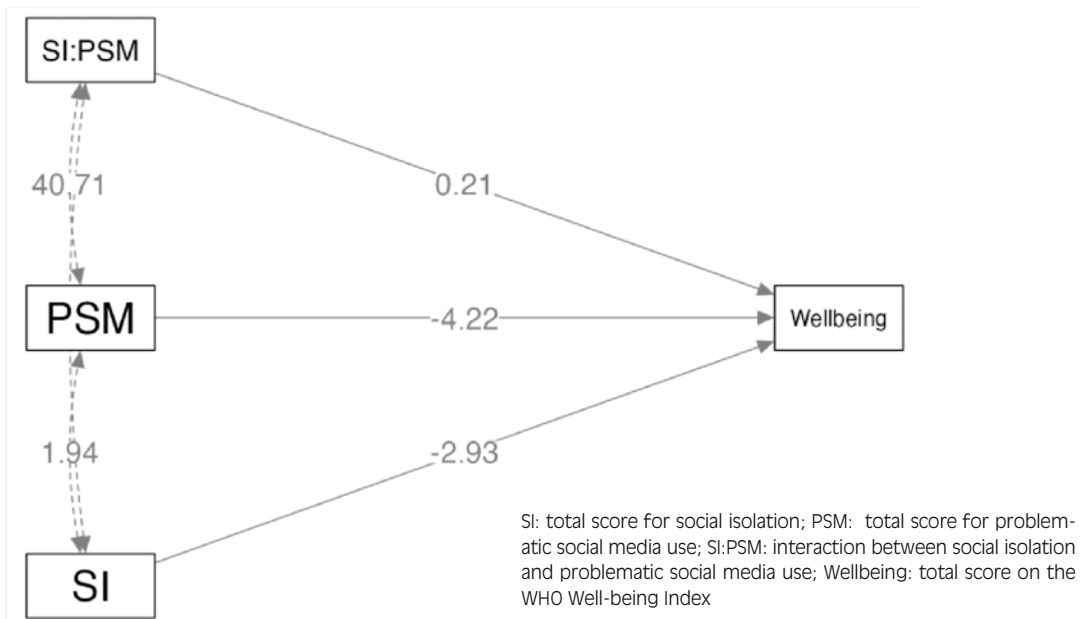


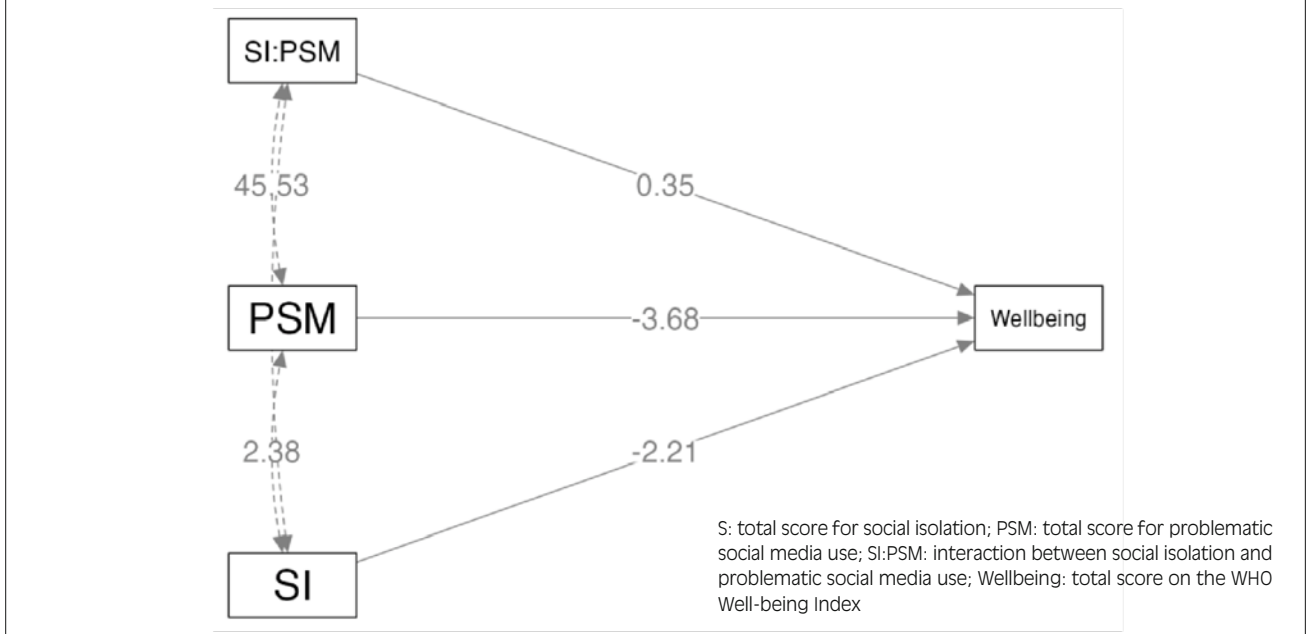
Fig. 2. Effect of social isolation and problematic social media use on wellbeing for Cluster 2.



in the literature. With regard to cluster 1 (Fig. 1), the results indicate a significant relationship between social isolation and well-being, where increasing levels of social isolation are associated with decreasing well-being scores (estimate = -2.4311,  $p < 0.001$ ). Similarly, a significant negative relationship is observed between problematic social media use and well-being, where higher levels of problematic social media use correspond to lower well-being scores (estimate = -1.5532,  $p = 0.016$ ). However, the interaction between social isolation and problematic social media use (SI\_total\_score: PSM\_total\_score) does not demonstrate a statistically significant effect, suggesting that the combined influence of these two

factors does not significantly impact well-being scores (estimate = 0.0630,  $p = 0.328$ ). In cluster 2 (Fig. 2), greater effects of social isolation on well-being are observed, in fact higher levels of social isolation are associated with lower well-being scores (estimate = -2.9343,  $p < 0.001$ ). The same applies to problematic social media use, which shows a significant negative relationship with well-being, therefore higher levels of problematic use are associated with lower well-being scores (estimate = -4.2239,  $p = 0.024$ ). Again, the interaction term between social isolation and problematic use of social media (SI\_total\_score:PSM\_total\_score) has a positive effect on well-being, but does not reach

Fig. 3. Effect of social isolation and problematic social media use on wellbeing for Cluster 3.



statistical significance (estimate = 0.2069,  $p = 0.302$ ), suggesting that there is no notable combined influence of these two factors on well-being.

Finally, in cluster 3 (Fig. 3), a significant negative effect of both social isolation ( $\beta = -2.2074$ ,  $p < 0.001$ ) and problematic social media use ( $\beta = -3.6772$ ,  $p = 0.002$ ) on well-being was observed, indicating that each factor, independently, was associated with decreased levels of well-being. However, the interaction analysis produced an unexpected positive relationship between these variables ( $\beta = 0.3535$ ,  $p = 0.006$ ). This interaction effect suggests that when social isolation and problematic social media use were present simultaneously, their combined impact on well-being was less detrimental than would be predicted by their individual negative effects. In particular, participants who reported high levels of social isolation and problematic social media use had relatively higher well-being scores than would be expected given the negative main effects of these factors taken individually.

## Discussion

The results of this study provide interesting information on the complex interplay between gambling behaviour, social isolation, problematic social media use and psychological well-being.

One of the main similarities between our results and those in the literature is the negative impact of social isolation on well-being. Consistent with Vaux's [18] social support theory and the findings of Holt-Lunstad et al. [9], our study found that social isolation significantly reduces well-being across all clusters. This is in line with the wider literature, which consistently highlights

the negative effects of social isolation on mental health, including increased anxiety, depression and reduced life satisfaction [6, 8].

However, our results also present some notable differences from literature. Contrary to expectations, the highest-risk group of gamblers (Cluster 3) reported the highest levels of well-being, despite exhibiting problem gambling-related behaviours, such as dishonesty and increased need to gamble. This result contradicts studies linking pathological gambling to lower well-being, increased anxiety and depression [2,5]. This can be read in light of the fact that while previous research has focused primarily on adult populations, our study specifically examined adolescents between the ages of 15 and 17. This age difference is crucial, as adolescents may experience and process gambling behaviors differently from adults due to different developmental factors. During adolescence, risk behaviors, including gambling, often occur within social contexts and can be perceived as normative experiences that contribute to identity formation and peer acceptance [25]. Research has shown that adolescents are more likely than adults to engage in gambling activities for social reasons and to perceive them as a form of entertainment rather than problem behavior [26]. Unlike adults, who may gamble in isolation or suffer significant consequences in their daily lives as a result of gambling, adolescents may integrate gambling into their social activities, seeing it as a means to build peer bonds and improve their social status [27]. In addition, neuroscientific research has shown that adolescents exhibit greater sensitivity to reward and a reduced ability to assess long-term consequences than adults [28]. This developmental trait may lead adolescents to focus more on the immediate positive aspects of gambling, such as excitement, social

interaction, and winnings, rather than the potential negative consequences [29]. The combination of greater sensitivity to reward and less financial responsibility than adults may explain why in our sample of adolescents problem gambling does not show the same negative association with well-being observed in adult populations [30]. Finally, another possible explanation involves compensatory mechanisms or a subjective perception of well-being that masks underlying vulnerabilities. Studies have shown that adolescents with problem gambling behaviors often use gambling as a maladaptive coping mechanism to regulate negative emotions and stress [21]. This coping strategy may be particularly relevant during adolescence, when emotional regulation skills are still developing and alternative coping mechanisms may be limited [31]. The temporary relief provided by play activities could help increase perceptions of well-being, even in the presence of problem behaviors. This is in line with Blaszczynski and Nower's [21] pathways model, which suggests that gambling may serve as an emotional regulation strategy for individuals experiencing psychological distress. Factors that may influence gambling behavior include parenting style. An authoritative and forgiving parenting style, characterized by warmth, acceptance and involvement, may be a protective factor, reducing the likelihood of gambling [32, 33]. In contrast, authoritarian parenting, characterized by severity and punitive practices, and neglectful parenting, defined by low involvement and emotional support, are associated with a higher risk of gambling [34]. Adolescents from authoritarian families are more likely to exhibit gambling-related problems, such as craving and loss of control, while those with neglectful parents may develop gambling behaviors to compensate for unmet emotional needs.

Another unexpected outcome was the higher level of social isolation reported by Cluster 1, the group with minimal or no involvement in gambling. This contradicts the literature, which usually associates lower involvement in gambling with stronger social ties and support systems [3]. Several developmental factors may explain this unexpected relationship, *e.g.*, adolescents who do not gamble, by not participating in socialization opportunities where gambling is a bonding mechanism, may find themselves isolated from the peer group, especially at a developmental stage when peer acceptance is critical for identity formation [31, 35]. In addition, their slightly elevated problematic use of social media suggests that these individuals may prefer interaction that occurs purely online, rather than interaction that occurs in person, this according to research, may intensify rather than alleviate feelings of isolation during adolescence [36, 37]. Finally, it is important to consider personality characteristics or pre-existing conditions such as introversion or social anxiety that may simultaneously promote abstention from gambling and broader social withdrawal [38].

The lack of significant differences in problematic social media use between the three groups also differs from

data found in the literature, in fact, excessive social media use is often correlated with increased gambling behavior and emotional distress [14, 15]. This could be attributed to the pervasive nature of social media use across all groups, regardless of gambling behaviour, suggesting that social media use could be a universal factor influencing well-being rather than a factor solely related to gambling. Finally, no significant interaction effect was observed between social isolation and problematic social media use in non-gamblers and occasional gamblers. The interaction effect observed exclusively in problem gamblers suggests that they may experience a unique synergistic relationship between social isolation and problematic social media use, consistent with Griffiths' [39] concept of "synergy of behavioral addiction," in which multiple maladaptive behaviors mutually reinforce each other during a developmental period characterized by increased reward sensitivity and emotional reactivity [40]. Unlike their peers, problem gamblers likely employ both gambling and excessive social media use as interconnected maladaptive coping strategies, creating a combined negative effect on well-being. In contrast, non-gamblers and casual gamblers appear to have developed more effective self-regulatory mechanisms that keep these risk factors functionally separate [41], aligning with Jessor's [42] theory of problem behavior, which views casual gambling as a potentially normative adolescent experimentation rather than a psychopathology. This developmental interpretation finds further support in neurobiological research indicating that adolescents with problem gambling show distinct neural responses to social exclusion [43] and in studies of peer relationships showing that problem gamblers often attend social environments in which multiple risk behaviors are normalized and reinforced together [44]. Furthermore, according to theories of personal predispositions, problem gamblers may possess temperamental characteristics that make them particularly responsive to social isolation and problematic social media use during this critical window of neurodevelopment, when prefrontal regulatory systems are still maturing unevenly across individuals [30, 45, 46].

In conclusion, while our findings align with the literature by highlighting the negative impact of social isolation on well-being, they also reveal unexpected patterns, particularly in the relationship between gambling behavior and well-being. These discrepancies suggest that the psychological mechanisms underlying gambling behavior and its impact on well-being may be more complex than previously understood, involving compensatory mechanisms, subjective perceptions of well-being, and social dynamics of gambling environments. Further research is needed to explore these relationships in more depth, particularly in the context of online gambling and social media use, to better understand how these factors interact with each other in influencing psychological well-being.



## Limitations

Of course, our study is not without its limitations. Primary among these is the cross-sectional design, which contributes to limiting the ability to establish causal relationships between the variables. Although the results suggest the existence of associations between the variables being studied, it is not possible to determine whether social isolation or problematic social media use directly lead to changes in well-being or gaming behavior, or vice versa. Longitudinal studies would be needed to explore these causal pathways over time.

Secondly, relying on self-report questionnaires introduces the potential for response bias. Participants might underestimate or overestimate their gambling behavior, social isolation or problematic social media use due to social desirability or recall bias. This is particularly relevant given the sensitive nature of gambling and the potential stigma associated with problematic behavior.

Another limitation is the homogeneity of the sample, composed mainly of adolescents between the ages of 15 and 17. Although this age group is particularly relevant for studying the early development of gambling and social media-related behavior, the results may not be generalisable to older populations. For example, the relationship between social isolation and gambling behavior might be different in adults who have more established social networks or financial responsibilities. Expanding the sample to include a wider age range and different demographic groups would improve the generalisability of the results.

The clustering method used to classify participants according to gambling behavior, while useful for identifying distinct patterns, may also oversimplify the complexity of gambling behaviors. The three clusters (non-gamblers, low-risk gamblers and high-risk gamblers) do not capture the full spectrum of gambling severity or the nuances of individual differences within each group. For example, the high-risk group (Cluster 3) included individuals with varying degrees of problem behavior, from those who gambled occasionally to those who exhibited more severe symptoms of pathological gambling. A more specific approach, such as using continuous measures of gambling severity, could provide a more detailed understanding of the relationships between gambling behavior and well-being. Finally, the study did not take into account potential confounding variables that could influence the observed relationships, such as personality traits, mental health history, or family dynamics. For example, individuals with preexisting mental health conditions, such as anxiety or depression, might be more susceptible to both social isolation and problem gambling, which could confound the results. Future research should consider incorporating these variables into the analysis to better isolate the effects of social isolation and problematic social media use on well-being.

In conclusion, although this study contributes to the growing literature on gambling behavior and its impact on well-being, we still know little about the interaction

effects of social isolation and problematic social media use on these phenomena. The limitations of our study highlight the need for further investigation with respect to these variables and others that may influence the effect gambling has on well-being.

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## Ethics approval

This study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Ethical Board of the National Institute of Health (General protocol: PRE-876/17) on 10 November 2017.

## Consent to participate

Informed consent was obtained from all subjects involved in this study.

## Conflicts of interest statement

The authors have explicitly stated that they have no known financial interests or personal affiliations with third parties that could potentially impact the outcome of this study.

## Availability of data and material

Data presented in this study are available in accordance with the 2022 Italian HBSC data access policy. Requests should be directed to the Italy Principal Investigator, Prof. Giacomo Lazzeri: giacomo.lazzeri@unisi.it.

## Authors' contributions

FM, FF: Conceptualization; Formal analysis; Writing-original draft; and Writing-editing. NC, MC: Writing-review & editing. UA: Data Curation. GL: Conceptualization; Data curation and Writing-review & editing.

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