Articles

The role of loneliness, negative affectivity, mentalization, and alcohol use in adolescent gambling

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Abstract

Background: The causes and consequences of youth problem gambling have become an area of increasing research interest. The present study investigated the role of loneliness, negative affective states, mentalization, and alcohol use among adolescent gamblers, exploring the relationships between the study variables utilizing path analysis.

Methods: A sample of 352 adolescents aged between 16-19 years were administered the (i) South Oaks Gambling Screen Revised for Adolescents, (ii) Loneliness and Aloneness Scale for Children and Adolescents, (iii) Depression Anxiety Stress Scales, (iv) Reflective Functioning Questionnaire, and (v) Alcohol Use Disorders Identification Test to assess gambling severity, loneliness, negative affectivity, mentalization, and alcohol consumption. It was hypothesized that: (i) female adolescents would be less likely to report gambling-related problems than male adolescents; (ii) loneliness, negative affectivity, deficit in mentalizing, and alcohol misuse would all be associated with gambling severity; and (iii) loneliness, negative affectivity, deficit in mentalizing, and alcohol misuse would all predict gambling severity. A further aim of the study was to explore the relationships between the study variables utilizing path analysis.

Results: The regression analysis indicated that male gender, affinity for loneliness, hypomentalizing, and alcohol use significantly predicted adolescent gambling severity. Path analysis showed that stress contributed to gambling severity directly as well as indirectly (via hypomentalizing). Analysis of direct and indirect effects showed that unbalanced mentalizing strengthened the effect of stress on gambling severity.

Conclusions: Given that loneliness and stress contribute to adolescent problematic gambling through the mediating role of hypomentalizing, clinical interventions should enhance adolescent gamblers' ability to process mental states in order to contribute to changing the trajectory that leads stressed and lonely adolescents to resort to gambling to improve their psychological wellbeing.

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1. Introduction

Research has consistently shown that problem gambling is a public health issue particularly among adolescents and young adults (Andrie et al., 2019; Calado et al., 2017; Riley et al., 2021; see Sideli et al., 2018, for a review). Although adolescents and young people tend to gamble less than adults, problem gambling prevalence rates are significantly higher than in adults (Calado et al., 2017). The results of the last report of the European School Survey Project on Alcohol and Other Drugs (ESPAD) indicated that Italy (where the present study was carried out) is one of the European countries with the highest rates of adolescent gambling involvement (32%) and problematic gambling (5.2%; ESPAD Group, 2020). The legalization, availability, and easy accessibility to many forms of gambling, as well as the social acceptance of gambling activities and utilization of modern technologies (e.g., gambling online via smartphones), have arguably contributed to the incidence and prevalence of adolescent gambling (for reviews see Andrie et al., 2019; Calado et al., 2017; Delfabbro et al., 2016). Moreover, a large body of research has highlighted that an early age of gambling onset is associated with a higher probability of developing more severe gambling-related problems later in life, engaging in other risk behaviors, and experiencing mental health disorders (Ciccarelli et al., 2021). From this perspective, understanding the factors characterizing adolescent problem gambling is crucial to develop intervention strategies aimed at preventing the development of addiction.

In addition to environmental and social factors (Blaszczynski & Nower, 2002), during adolescence there are many individual characteristics that contribute to the acquisition, development and maintenance of addiction in general (and gambling behavior in particular) (Scholes-Balog et al., 2014; Shead et al., 2010; Stojadinovic, 2020). For instance, recent studies have focused on the role of loneliness in adolescent gambling behavior (e.g., Sirola et al., 2019; Vuorinen et al., 2021), mostly because "adolescents and emerging adults are also vulnerable populations to the harms of loneliness, as well as increasingly susceptible to destructive behaviors" (Savolainen et al., 2020, p. 10).

Loneliness refers to the negative feelings that emerge when individuals experience their social relationships as deficient. More specifically, loneliness is an unpleasant subjective feeling that occurs when individuals perceive their network of social relationships as deficient in a quantitative or qualitative way (Perlman & Peplau, 1981). According to Long and Averill (2003), loneliness is different from being alone (i.e., aloneness), which is the objective experience of being without company, since individuals may feel lonely when alone, but also when they are surrounded by other individuals (Maes et al., 2016).

Although studies on the relationship between loneliness and gambling are not always directly comparable due to the different instruments used to assess loneliness (with some studies using only one or few loneliness questions and others using multidimensional measures), evidence from the literature suggests that loneliness is one of the contributing factors for problem gambling (e.g., Botterill et al., 2016; Castrén et al., 2013; Hardoon et al., 2004; Petry & Weiss, 2009; Savolainen et al., 2020), particularly among adolescents (Gupta & Derevensky, 1998), probably because individuals gamble mainly to avoid or reduce noxious physiological states or dysphoric mood (Blaszczynski et al., 1986) or to escape from real life problems, including emotional and social isolation (King et al., 2010). While loneliness plays a primary and important role in all levels of problem gambling behavior (McQuade & Gill, 2012), it remains still unclear to what extent loneliness is a predisposing condition for problematic gambling or an outcome, since "pre-existing loneliness may be exacerbated by the shame and secretiveness felt when financial or control problems arise in the course of gambling" (Trevorrow & Moore, 1998, pp. 282-283). In other words, excessive involvement in gambling activities, as well as the stigma associated with problematic gambling, might contribute to foster attitudes toward aloneness in gamblers (Hing et al., 2016a).

Since adolescents' struggling to find a balance between social connectedness and independence may lead to increased feelings of loneliness (Larson et al., 1996), gambling – usually used as a strategy for coping with loneliness and/or as a way for hiding in the eyes of others – could interfere with the search for this balance. Moreover, considering that adolescents are particularly vulnerable to experience feelings of loneliness (Danneel et al., 2018; Twenge et al., 2021) and to develop gambling problems, the association between loneliness and problematic gambling need to be further investigated, especially in countries with high rates of adolescent gambling involvement.

Individuals usually gamble to ameliorate mood. Moreover, research has consistently highlighted the role of negative emotions in facilitating gambling involvement, and recent studies have demonstrated that even the difficulty to accept positive emotions, as well as the proneness to act impulsively when experiencing positive emotions, is a strong predictor of gambling severity (Rogier et al., 2020). Among the motivations to gamble, one of the most reported is to suppress or escape negative emotional states (Blaszczynski & Nower, 2002; Wood & Griffiths, 2007). More specifically, adolescent problem gamblers have high levels of depression, anxiety, and perceived stress (Cosenza et al., 2019a; Nigro et al., 2017). Several studies have found that negative affective states are not only associated with gambling, but also with loneliness (e.g., Cacioppo & Hawkley, 2009; Chang et al., 2008; Hawkley & Cacioppo, 2010; Lasgaard et al.,

2011; Muyan et al., 2016; Vanhalst et al., 2012; Yarcheski et al., 2011), and with a deficit in mentalizing (Luyten & Fonagy, 2016, 2018; Luyten et al., 2012; Nolte et al., 2011; for a review, see Luyten et al., 2020).

Also known as reflective functioning, mentalization is a form of social cognition that comprises the ability to perceive and interpret both the self and others' behavior in terms of intentional mental states, such as thoughts, feelings, desires, wishes, goals, and attitudes (Fonagy et al., 2012). As recent research has demonstrated, general impairment in mentalizing plays a key role in gambling behavior among both adolescents and adults (Ciccarelli et al., 2021; Cosenza et al., 2019a; Spada & Roarty, 2015). More specifically, mentalization impairments predict not only gambling behavior but also chasing frequency, representing a risk factor for disordered gambling (Nigro et al., 2019).

Interestingly, some studies on alcohol dependence have found an association between alcohol misuse and mentalizing deficits (e.g., Le Berre, 2019; Maurage et al., 2015; Uekermann et al., 2007), and others have indicated that alcohol consumption is a strong predictor of adolescent gambling severity (e.g., Ciccarelli et al., 2016; see Rahman et al., 2014 and Rash et al., 2016, for reviews). Such findings suggest that both poor mentalization and alcohol consumption contribute to exacerbate gambling dependence among adolescents.

Summing up, there is a general agreement about the role played by negative psychological states, such as depression, anxiety, and stress (Cosenza et al., 2019a; Nigro et al., 2017), and metacognitive deficit in adolescent gambling behavior (Ciccarelli et al., 2021; Cosenza et al., 2019b). Similarly, some studies highlighted significant associations between loneliness and both negative affectivity (e.g., Vanhalst et al., 2012; Yarcheski et al., 2011) and reduced metacognitive abilities (see for example Devine & Hughes, 2013). On the whole, such findings suggest that gambling addiction and loneliness share some underlying features (or commonalities), which should be considered when analyzing the role of loneliness in gambling behavior, bearing in mind, at the same time, that there are different facets of the loneliness experience that should be taken into account (Goossen et al., 2009).

1.1. Hypotheses

Based on the aforementioned literature suggesting that loneliness, negative affective states, imbalances in mentalizing, and alcohol misuse are somewhat intertwined in gambling behavior, the present study investigated the reciprocal links among these constructs and their role in adolescent gambling. In line with previous research (for reviews, see Delfabbro et al., 2018; Hing, Russell, et al., 2016), it was hypothesized that: (i) female adolescents would be less likely

to report gambling-related problems than male adolescents (H_1); (ii) loneliness, negative affectivity, deficit in mentalizing, and alcohol misuse would all be associated with gambling severity (H_2); and (iii) loneliness, negative affectivity, deficit in mentalizing, and alcohol misuse would all predict gambling severity (H_3). A further aim of the study was to explore the relationships between the study variables utilizing path analysis.

2. Methods

2.1. Participants

The sample comprised 352 adolescents (50.3% boys) aged between 16 and 19 years (M_{age} = 17.69 years; SD = .70) attending different public high schools in Southern Italy. More specifically, seven public high schools (both technical institutes and lyceums) in Southern Italy (cities of Naples and Salerno) were contacted to participate in the study. The schools were selected based on convenience in scheduling data collection. None of the selected schools declined to participate. The only inclusion criteria were being (i) students currently attending high school and (ii) willing to take part in the study after being informed of all its aspects that could have influenced the decision to participate.

2.2. Procedure and ethics

Participants were administered the Italian versions of the (i) South Oaks Gambling Screen Revised for Adolescents (SOGS-RA; Winters et al., 1993; Colasante et al., 2014) to assess adolescent gambling problems, (ii) Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen et al., 1987; Melotti et al., 2006) to assess loneliness, (iii) 21-item Depression Anxiety Stress Scales (DASS-21; Henry & Crawford, 2005; Bottesi et al., 2015) to assess negative affectivity, (iv) 8-item Reflective Functioning Questionnaire (RFQ-8; Fonagy et al., 2016; Morandotti et al., 2018) to assess mentalization/reflective functioning, and (v) Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993) to assess alcohol consumption, drinking behaviors, and alcohol-related problems. The order of presentation of the five measures in the survey was counterbalanced.

For each measure in the survey, participants received detailed written instructions on how to complete them. Participants could ask any questions about the survey if they had any. The surveys were handed out and completed in the classroom. Administration of the instruments took approximately 35 minutes. Participants did not receive anything for participating in the study. The study procedures were carried out in accordance with the Declaration of Helsinki. The research team's University Ethics Committee approved the study. All participants were

informed about the study, and all provided informed consent. For minors, informed consent was obtained from their parents.

2.3. Measures

Problem gambling. Problem gambling was assessed using the SOGS-RA. The SOGS-RA consists of 12 scored items assessing adolescent gambling behavior and gambling-related problems during the past 12 months. In addition to the scored items, the SOGS-RA also assesses the frequency of participation in different gambling activities, the largest amount of money gambled in one day, and parental involvement in problematic gambling. The scale comprises 12 scored dichotomous (*yes/no*) items assessing gambling behavior and gambling-related problems during the past 12 months. The total score ranges from a minimum of 0 to a maximum of 12. In addition, participants were asked to indicate their main reasons for gambling in a list of motives (Volberg, 1993). Consistent with Winters et al. (1993, 1995), a score of 0–1 is indicative of "nonproblem" gambling, a score between 2 and 3 reflects an "at-risk" level of gambling, whereas a score of 4 or more is indicative of "problem gambling". The Italian version of the SOGS-RA was found to have acceptable internal reliability ($\alpha = 0.78$; Colasante et al., 2014). In the present study, Cronbach's alpha was 0.77.

Loneliness. Loneliness was assessed using the LACA, a multidimensional measure of loneliness and attitude to being alone that are considered relevant during adolescence. It comprises 48 items that are divided into four subscales (12 items each) assessing the following dimensions: loneliness in relationships with parents (L-PART), loneliness in relationships with peers (L-PEERS), negative attitude toward being alone (A-NEG), and positive attitude toward being alone (A-POS). Participants rate each statement as it applies to them using a four-point scale, ranging from 1 (*never*) to 4 (*often*). Previously the LACA has been referred to as the Louvain Loneliness Scale for Children and Adolescents (LLCA; e.g., Marcoen et al., 1987). The LACA was developed specifically for the age range of 10–19 years, since the available measures for adults were deemed too difficult in wording or seemed developmentally inappropriate (Gooessens & Maes, 2017). In the present study, the Cronbach's alphas were as follows: L-PART = 0.87, L-PEERS = 0.94, A-NEG = 0.80, A-POS = 0.84, and 0.89 for the full scale.

Negative psychological states. Negative affective states were assessed using the DASS-21, a self-report measure assessing the three related negative affective states of depression, anxiety, and stress. The Depression subscale includes items that assess symptoms typically associated with dysphoric mood, such as sadness, worthlessness, lack of interest or involvement, and low self-esteem. The Anxiety subscale assesses symptoms of physical arousal, panic attacks, and

subjective experience of fear. The Stress subscale assesses symptoms such as difficulty relaxing, impatience, and being easily upset, irritable or overreactive. Participants are asked to indicate how much each statement applied to them during the previous week on a four-point scale, ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). Higher scores indicate severe emotional distress. In the present study, Cronbach's alphas were 0.86 for the Depression subscale, 0.81 for the Anxiety subscale, 0.85 for the Stress subscale, and 0.93 for the full scale.

Mentalization. Mentalization/reflective functioning was assessed using the RFQ-8. Participants are required to indicate how much they disagree or agree with each statement using a seven-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The RFQ-8 consists of two subscales, tapping into different processes: certainty about mental states (RFQ-C) and uncertainty about mental states (RFQ-U). Low agreement on the RFQ-C scale reflects a tendency to develop excessive but inaccurate mentalizing (hypermentalizing), while high agreement reflects more genuine mentalizing. Likewise, high scores on the RFQ-U indicate an almost complete lack of knowledge about mental states (hypomentalizing), while lower scores reflect acknowledgment of the opaqueness of an individual's own mental states and that of others, characteristic of genuine mentalizing. Internal consistency was satisfactory for the RFQ-C subscale (0.70), and slightly lower but still satisfactory for the RFQ-U subscale (0.64).

Alcohol use. Alcohol consumption, drinking behaviors, and alcohol-related problems were assessed using the AUDIT. The AUDIT is a 10-item self-report scale that comprises three questions concerning the amount and frequency of drinking alcohol, three questions concerning alcohol dependence, and four questions concerning problems caused by drinking alcohol. Participants respond to each question on a seven-point scale, ranging from 0 (*never*) to 4 (*daily or almost daily*). A score of 8 or more indicates a strong likelihood of harmful alcohol use. In the present study, Cronbach's alpha was 0.81.

2.4 Statistical analyses

Data analyses were conducted using IBM SPSS version 27.0. The α level was set at $p < .05$. All variables were initially screened for missing data, distribution abnormalities, and outliers (Tabachnick & Fidell, 2019). Using $p < .001$ criterion for Mahalanobis distance, five participants were eliminated as clear multivariate outliers. A final sample size of 352 remained for analysis.

Pearson correlation coefficients were calculated to examine the relationships among the study variables. Univariate measure ANOVAs were used to assess mean differences on continuous variables. For categorical data, differences in percentages were compared with the chi-square

test. Hierarchical linear regression analyses were performed to examine the unique contribution of predictor variables to gambling severity. To control for the presence of multicollinearity, before interpreting the regression coefficients, the variance inflation factors (VIF) were calculated. Finally, to explore the relationships among the study variables, path analysis was carried out using the EQS 6.2 software program for structural equation modeling (Bentler, 2008). For each estimated model, the goodness of model fit was evaluated with the likelihood ratio chi-square test statistic corrected for data nonnormality with Satorra and Bentler's (1994) method (S-B χ^2), as well as with four descriptive fit indices: the standardized root-mean-square residual (SRMR), the root-mean-square error of approximation (RMSEA) with its 90% confidence interval (90% CI), the goodness of fit index (GFI), and the comparative fit index (CFI). Acceptable fits between model and data are reflected by a non-significant S-B $\chi^{2,}$ GFI and CFI indexes of 0.95 or greater, RMSEA of between 0.05 and 0.08.

3. Results

In accordance with Winters et al.'s (1993, 1995) original SOGS-RA scoring system, participants were classified in the following four categories: non-gamblers, that includes individuals who reported no past-year gambling, non-problem gamblers (score of 0–1), at-risk gamblers (score between 2 and 3), and problem gamblers (score of 4 or more). Of the total sample, 16.5% were classified as non-gamblers, 50.6% as non-problem gamblers, 21.3% as at-risk gamblers, and 11.6% as problem gamblers.

Chi-square test was used to ascertain whether there was an association between severity of gambling involvement and each motive for gambling. The 58 participants who reported no past-year gambling were excluded from analysis. Results indicated that at-risk gamblers and problem gamblers gambled significantly more to win money (χ^2 (df=2, N=294) = 77.29; p<.001; Cramér's V = .51), for excitement or as a challenge (χ^2 (df=2, N = 294) = 14.21; p<.01; Cramér's V = .16). However, irrespective of gambling involvement, 55.8% of participants gambled mainly for fun or entertainment.

In relation to H_1, chi-square analyses showed differences in the distribution of male and female participants among SOGS-RA groups [χ^2 (3, N = 352) = 53.2; p<.001; Cramér's V = 0.39], with the at-risk gambler group and problem gambler group mainly comprising males. Therefore, H_1 was supported. Results of univariate ANOVAs showed significant gender differences on both the SOGS-RA and AUDIT scores, with males scoring higher than females, and on the DASS-

21, with females scoring higher than males on the three subscales. Descriptive statistics and results of the univariate ANOVAs are reported in Table 1.

In relation to H_2, the relationships between all study variables were assessed first using Pearson correlation coefficients. Considering ANOVA results, to determine whether the measures remained correlated after controlling for gender, partial correlations were computed (see Table 2). As Table 2 shows, with only a few exceptions, association with effect sizes were moderate to strong (Cohen, 1988). Therefore, H_2 was supported.

Table 1. Means and standard deviations as a function of gender and results of univariate ANOVA

	Males ($N = 177$)		Females ($N = 175$)		Gender effects (univariate F)		
Variables	Mean	SD	Mean	SD	$F_{1, 350}$	p	η_p^2
SOGS-RA[1]	2.09	2.37	0.69	1.08	50.86	<.001	.127
RFQ-8[2]							
Certainty	0.99	0.78	0.85	0.66	1.90	ns	
Uncertainty	0.74	0.60	0.85	0.58	1.17	ns	
LACA[3]							
L-PART[4]	23.28	6.43	22.10	7.26	2.62	ns	
L-PEERS[5]	20.72	8.31	21.13	8.02	.23	ns	
A-NEG[6]	27.82	6.28	28.54	6.07	1.17	ns	
A-POS[7]	31.05	6.45	31.33	6.98	.15	ns	
DASS-21[8]							
Depression	6.43	5.53	7.73	5.39	5.13	.024	.014
Anxiety	4.07	4.33	6.01	4.86	16.14	<.001	.043
Stress	7.48	5.12	9.66	5.41	15.11	<.001	.041
AUDIT[9]	5.12	4.60	3.07	3.11	23.93	<.001	.064

Note: [1]South Oaks Gambling Screen Revised for Adolescents; [2]Reflective Functioning Questionnaire; [3]Loneliness and Aloneness Scale for Children and Adolescents; [4]Loneliness in relationships with parents; [5]Loneliness in relationships with peers; [6]Negative attitude toward being alone; [7]Positive attitude toward being alone; [8]Depression Anxiety Stress Scales; [9]Alcohol Use Disorders Identification Test.

In relation to H_3, to identify the potential predictors of gambling behavior, gender (at first step), scores on DASS-21, LACA, and RFQ-8 dimensions, and AUDIT scores (at second step) were input to a hierarchical multiple regression analysis with SOGS-RA as the dependent measure. Results showed that, along with male gender, high scores on the DASS-21 Stress dimension, the RFQ-U subscale, the dimension affinity for loneliness (LACA A-POS), and AUDIT were significant predictors of gambling severity (see Table 3). Therefore, H_3 was supported. The overall model explained one-third of the total variance of the SOGS-RA ($R^2_{adj} = 0.295$; $F_{5, 348} = 30.35$; $p<.001$).

3.1 Path analysis

Considering evidence from the aforementioned research on the role of gender, negative affective states, positive affinity to loneliness, poor mentalization, and alcohol use on gambling involvement and the results of the linear regression analysis, path analysis was performed to analyze the possible causal relationships among variables contributing to gambling severity.

Table 2. Correlations among the study variables after partialling out gender

	2	3	4	5	6	7	8	9	10	11
1. SOGS-RA[1]	-.219**	.258**	.149**	.021	.164**	-.022	.235**	.204**	.273**	.377**
RFQ-8[2]										
2. Certainty	-	-.595**	-.117*	-.272**	-.253**	-.144**	-.281**	-.335**	-.319**	-.071
3. Uncertainty		-	.202**	.317**	.254**	.229**	.475**	.466**	.518**	.165**
LACA[3]										
4. L-PART[4]			-	.360**	.025	.168**	.343**	.217**	.174**	.193**
5. L-PEERS[5]				-	.142**	.429**	.470**	.326**	.283**	.066
6. A-NEG[6]					-	-.129*	.242**	.273**	.273**	.098
7. A-POS[7]						-	.253**	.185**	.276**	.018
DASS-21[8]										
8. Depression							-	.656**	.679**	.228**
9. Anxiety								-	.672**	.134*
10. Stress									-	.219**
11. AUDIT[9]										-

Note: [1]South Oaks Gambling Screen Revised for Adolescents; [2]Reflective Functioning Questionnaire; [3]Loneliness and Aloneness Scale for Children and Adolescents; [4]Loneliness in relationships with parents; [5]Loneliness in relationships with peers; [6]Negative attitude toward being alone; [7]Positive attitude toward being alone; [8]Depression Anxiety Stress Scales; [9]Alcohol Use Disorders Identification Test.

Note. *$p<.05$; **$p<.01$.

To ascertain if stress was the mediator of the impact of poor mentalization on gambling severity or if uncertainty about mental states (high scores on the RFQ-U scale) was on the path from stress to gambling involvement, two different models were compared: the former (Model 1) assumed that high RFQ-U scores predict gambling severity not only directly, but also indirectly via high scores on the stress subscale; the latter (Model 2) assumed that stress predicts gambling severity not only directly, but also indirectly via RFQ-U scores.

As model fit statistics (GFI and CFI estimates, RMSEA and SRMR values) indicated, relative to the first model (S-Bχ^2 = 34.00; *df* = 3; $p<.001$; RMSEA = .172; SRMR = .052; CFI = .90; GFI = .97), the second one fit the data very well (S-Bχ^2 = 5.47; *df* = 3; $p=.14$; RMSEA = .048; SRMR = .022; CFI = .99; GFI = .99). Beta values showed that both the total effect (Z = 2.61; $p<.05$) and the indirect effect of Stress on SOGS-RA scores (Z = 4.51; $p<.05$) were significant. These results support the hypothesis that stress can contribute to gambling severity directly, as

well as indirectly, via poor mentalization. More specifically, effects decomposition showed that unbalanced mentalizing could significantly strengthen the effect of stress on gambling severity.

Table 3. Summary of hierarchical multiple regression analysis with SOGS-RA total score as the dependent variable

Variable	B	R^2	ΔR^2	β	t	p	VIF
Step 1							
Gender	-1.405	.127	.127	-.360	-7.133	.000	1.000
Step 2							
Gender	-1.041	.251	.124	-.414	-5.515	.000	1.068
AUDIT[1]	.177			.264	7.609	.000	1.068
Step 3							
Gender	-1.146	.286	.034	-.384	-6.148	.000	1.089
AUDIT	.162			.281	6.996	.000	1.099
RFQ-8[2] - Uncertainty	.634			-.125	4.092	.000	1.038
Step 4							
Gender	-1.240	.296	.011	-.386	-6.535	.000	1.142
AUDIT	.153			.224	6.587	.000	1.127
RFQ-8 - Uncertainty	.430			-.114	2.416	.016	1.385
DASS-21[3] - Stress	.046			-.110	2.296	.022	1.462
Step 5							
Gender	-1.260	.305	.009	-.393	-6.662	.000	1.145
AUDIT	.151			.243	6.500	.000	1.130
RFQ-8 - Uncertainty	.470			-.097	2.637	.009	1.401
DASS-21 - Stress	.054			-.128	2.668	.008	1.520
LACA[4] -Positive Affinity to Loneliness	-.029			-.112	-2.097	.038	1.098

Note. B: unstandardized coefficient; ΔR^2: R square change; β: standardized regression coefficient; VIF: Variance Inflation Factor.

[1]Alcohol Use Disorder Identification Test; [2]Reflective Functioning Questionnaire; [3]Depression Anxiety Stress Scales; [4]Loneliness and Aloneness Scale for Children and Adolescents.

Overall, the results support the hypothesis that stress can contribute to gambling severity even via poor mentalization. The path diagram for Model 2 (with standardized estimates) can be found in Figure 1.

4. Discussion

The present study is the first to investigate the relationships of loneliness, negative affective states, mentalizing, and alcohol use to gambling severity among adolescents. All hypotheses (H_1-H_3) were supported. Overall, data from the study indicated that the higher the involvement in gambling, the higher the perceived stress and the alcohol consumption, but the lower the awareness concerning mental states and the affinity for loneliness. More interestingly, the results of path analysis showed that poor mentalization could strengthen the effect of stress on gambling severity. As expected, and in line with previous research, males were far more likely at-risk or problem gamblers than females (e.g., Calado et al., 2017; Cosenza & Nigro, 2015; Cosenza et al., 2019b; Delfabbro et al., 2018; Hing et al., 2016; Nigro et al., 2017; Scholes-Balog et al., 2014; Volberg et al., 2018; Welte et al., 2015; for reviews see also Donati et al., 2013; Dowling et al., 2017).
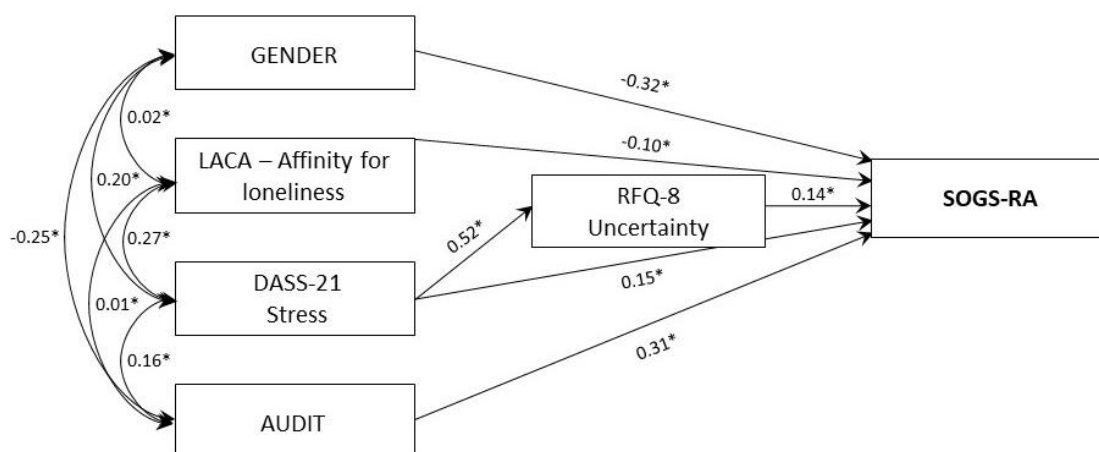

Figure 1 – *Path diagram for Model 2*

Note. *Standardized solution

As for loneliness, the results were consistent with previous research on the association between negative emotional states and loneliness (e.g., Cacioppo & Hawkley, 2009; Chang et al., 2008; Hawkley & Cacioppo, 2010; Lasgaard et al., 2011; Muyan et al., 2016; Vanhalst et al., 2012; Yarcheski et al., 2011), but not with studies reporting a positive association between loneliness and gambling involvement among adults (e.g., Botteril et al., 2016) and adolescents (Castrén et al., 2013; Gupta & Derevensky, 1998; Savolainen et al., 2020). Indeed, unexpectedly, regression analysis results found a negative association between affinity for loneliness and gambling involvement. Such a result suggests that solitude represents a protective factor for problem gambling. Given that gambling also serves as a coping mechanism to deal with emotional and

social isolation, it may be the more that individuals appreciate being alone, the less they are attracted to gambling (King et al., 2010). Moreover, the significant positive correlations between negative affectivity and gambling on the one hand, and the negative association between preference for solitude and gambling on the other is somewhat puzzling, if only because it revives the longstanding debate about costs and benefits of solitude for individual well-being (Coplan et al., 2019; see also Coplan et al., 2018). Positive attitudes and desires to be alone (affinity for aloneness) could move away from gambling (this would be the benefit), while the association with perceived stress would be the cost of solitude. This result dovetails with studies demonstrating that positive attitude toward loneliness is associated with low self-esteem and stress (Hawkley & Cacioppo, 2010), probably because, according to the evolutionary theory of loneliness, "in lonely people a survival mechanism is activated that heightens sensitivity to threats, which is accompanied by negative feelings such as stress and low self-esteem" (Maes et al., 2016, p. 562).

Confirming the hypothesis, gambling severity was positively associated with subjective psychological distress (depression, anxiety, and stress) and that stress particularly was the most powerful predictor of gambling involvement. This finding is consistent with prior research demonstrating that negative emotional states are significant correlates with problem gambling (e.g., Barrault & Varescon, 2013; Cosenza et al., 2019b; Dowling et al., 2015; El-Guebaly et al., 2006; Johansson et al., 2009; Kim et al., 2006; Ladouceur et al., 2006; Lorains et al., 2014; Nigro et al., 2017; Toneatto & Pillai, 2016). Even if it is difficult to establish whether negative psychological states are primary, secondary, or concurrent with gambling, the results of path analysis corroborate the hypothesis that negative affectivity directly predicts gambling behavior (Raylu et al., 2016).

Overall, these results should be interpreted considering the particular historical period when the present study was conducted, namely during the COVID-19 pandemic (even if not during the lockdown). Several studies in the literature have addressed the impact of the COVID-19 pandemic on gambling involvement, analyzing the role of restrictions and others risk factors in favoring or contrasting gambling (e.g., Black et al., 2022; Frisone et al., 2020; Gainsbury et al., 2021; Sachdeva et al., 2022; Yahya & Khawaja, 2020). Although these studies have reached contrasting results about the decrease or increase in gambling involvement during the pandemic (for reviews see Brodeur et al., 2021; Quinn et al., 2022), there is no doubt that the psychological distress and loneliness, already risk factors for problem gambling, have been extensively experienced as a result of the COVID-19 pandemic (Stark & Robinson, 2021).

Regarding mentalization, the results obtained resonated with previous findings reporting a significant association between negative psychological states and deficit in mentalizing (Luyten et al., 2012; Luyten & Fonagy, 2016, 2018; Nolte et al., 2011; see also Luyten et al., 2020), and with research investigating the role of poor mentalization in adolescent gambling (Ciccarelli et al., 2021; Cosenza et al., 2019b; see also Nigro et al., 2019; see also Ciccarelli et al., 2022 for similar results in gaming). The idea that metacognition is impaired in gambling addiction has received indirect support from previously identified dissociations between subjective evaluation of performance and actual performance. As earlier studies reported, disordered gamblers appear to be more overconfident than non-problem gamblers in a betting task (Goodie, 2005) and show more overconfidence, risk acceptance, and myopic focus on gambling-related wins (Lakey et al., 2007). Along with Brevers et al. (2013, 2014), disordered gamblers "exhibited impairments not only in their ability to correctly assess risk in situations that involve ambiguity, but also in their ability to correctly express metacognitive judgments about their own performance" (Brevers et al., 2013, p. 142). Indeed, during a gambling-like task (Brevers et al., 2013), as well as a non-gambling task (Brevers et al., 2014), problem gamblers tended to wager high when performing poorly. These results suggested that the tendency of problem gamblers to perform poorly but overestimate their own performance would stem from deficit in mentalization.

Although mentalization does not only refer to the ability to introspect about self-performance, but also to the capacity to interpret others in terms of internal mental states such as feelings, wishes, goals, desires, and attitudes (Fonagy et al., 2016), the findings of the present study suggest that severe gambling involvement depends on deficits in consciousness concerning an individual's mental states. Even if hypermentalizing and hypomentalizing, as assessed by the RFQ-8, represent two maladaptive polarities, rather than two different facets of mentalizing (Müller et al., 2021), different psychopathologies reflect different imbalances along the dimensions of mentalizing, resulting in different mentalizing profiles that are characteristic of each disorder (Luyten et al., 2020). Overall, it appears that an almost complete lack of knowledge about mental states (*hypomentalizing*) shapes the profile of gambling disorder at least among adolescents and emerging adults.

The association between gambling severity and alcohol consumption confirms their reciprocal influence (e.g., Barnes et al., 2002; Desai et al., 2005; Duhig et al., 2007; Liu et al., 2009). More specifically, alcohol use was found to be a strong predictor of adolescent gambling severity, in line with previous findings (e.g., Ciccarelli et al., 2016, 2019, 2020; Cosenza et al., 2020; for reviews, see Rahman et al., 2014 and Rash et al., 2016). In addition, alcohol consumption shared

some associations with gambling, such as hypomentalizing and psychological distress, supporting the view that there are common risk factors between problem gambling and alcohol dependence that could be responsible for their comorbidity (e.g., Slutske et al., 2000). Moreover, scholars should examine not only the biological mechanisms underlying the genetic predispositions to addictions (Shaffer, 1991), but the meaning of these behaviors, adopting a person-centric perspective (Hellman, 2021). An example is constituted by the narratives that help to improve the understanding of addictions and recovery (Boyer, 1997; Caputo, 2015; Reith & Dobbie, 2012). As suggested, individuals could be so "disinterested in their life that nothing is more satisfying than that refuge offered by substance use as in cases of drug addiction, or activity as in the cases of gambling disorder" (Frisone, 2021, p. 4).

Finally, since adolescents experiencing high levels of stress and with a reduced ability to reflect about their own mental states are potentially more vulnerable to problem gambling, in line with the treatment of substance abuse patients (Möller et al., 2016; Philips et al., 2012), psychological clinical interventions should address enhancing adolescent gamblers' ability in the processing of mental states content and to reduce negative emotional states associated with both aloneness and gambling.

5. Limitations

Although there are several strengths of this study, including the range and the psychometric robustness of the measures used, there are some limitations that should be considered when interpreting the present results. First, data were exclusively based on self-report measures that limit the generalizability of the results due to recall bias and social desirability. Another limitation regarded the representativeness of the final sample, given that Campania - where the present study was carried out – is among the regions with the highest prevalence rate of adolescents (aged 15-19 years) who have gambled at least once in the last year compared to other regions of Italy (ESPAD, 2020). Moreover, the use of the SOGS-RA to assess gambling severity could be regarded as a further limitation of the present study. However, even if some authors have questioned the validity of SOGS-RA (see Stinchfield, 2010 for a review), others support the suitability of the instrument as a screening tool among adolescent populations (see Chiesi et al., 2013).

6. Conclusions

Despite the limitations, the present study provided insight into the interrelationships between loneliness, emotional distress, and mentalization that together contribute to problem gambling

behavior in adolescence. It may be that problem gamblers, who have difficulties in managing negative emotions experienced as overwhelming, engage in impulsive behaviors such as gambling to dampen their emotional arousal. Finally, there is good evidence to suggest that both a balanced capacity for mentalizing and affinity for loneliness represent protective factors for problem gambling during adolescence.

The present results also suggested that loneliness and stress contribute to gambling through the mediating role of hypomentalizing, suggesting that gamblers who have difficulties in reflecting on mental states are more vulnerable to developing gambling problems when feeling alone and stressed. These findings also have clinical implications, in as much as they suggest that psychological interventions aimed at improving mentalizing abilities could contribute to changing the trajectory that leads stressed and lonely adolescents to resort to gambling to improve their psychological wellbeing.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any potential conflict of interest.

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