Title: Risk factors for nonpathological video game playing and gambling among adolescents: Results of a multicenter survey

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Declaration Section

Conflict of interest: The authors have no conflicts of interest to declare. All co-authors have seen and agree with the contents of the manuscript and there is no financial interest to report.

Ethics statement: The study was approved by the Ethical Committee of ASST Spedali Civili Hospital, Brescia, Italy (Register Number: NP3862, January 29, 2020). All methods were carried out in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed consent: Written informed consent was obtained from all participants or, if participants are under 18, from a parent and/or legal guardian.

Data Availability Statement: Both the data and the analysis code that support the findings of this study are available from the corresponding author upon reasonable request.

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Risk factors for nonpathological video game playing and gambling among adolescent students: Results of a multi-school survey

Abstract

Background: This study explored the influence of sociodemographic, academic, and emotional/behavioral factors on nonpathological video gaming and gambling among adolescent students in Italy.

Methods: A sample of 477 students (median age = 16 years; 70% female) completed an online questionnaire during school time. Participants had no gaming or gambling disorders. Relationships between risk factors and gaming/gambling behaviors were analyzed using univariate and multivariate logistic regression models.

Results: 56% of participants engaged in video gaming, with 29% also gambling. 21% exclusively gambled, and 77% of them also played video games. Video gaming was less common among females, non-Italians, high school students, and those with high anxiety/depression levels. It was more common among gamblers and those with social problems. Gambling was less frequent among females but more so among older adolescents and video gamers. Combined activities were less common for females and those with high anxiety/depression, but more common for those with social problems.

Conclusions: Male adolescents were more inclined toward gambling and video gaming. Those with social challenges preferred video games, while older adolescents leaned more towards gambling. Future research should examine the nuances between non-problematic gambling/gaming and their potential long-term impacts.

Keywords: gaming, gambling, adolescence, teenagers, students.

Risk factors for nonpathological video game playing and gambling among adolescent students: Results of a multi-school survey

Introduction

The digital age has transformed the way adolescents spend their leisure time, with video games and online gambling emerging as the predominant pastimes. As the popularity of these activities increases, understanding their influence on adolescent health and development is drawing increasing attention from researchers, educators, and parents.

Adolescence is a pivotal developmental phase characterized by increased risk taking, due to the limited ability of young people to anticipate potential adverse outcomes [1,2]. There is also a greater likelihood for adolescents to develop addictive behaviors [3,4]. Consequently, this period could be particularly vulnerable to the emergence of internet addiction and gambling-related issues [5,6]. Much of the existing research delves into the pathological aspects of gaming and gambling, highlighting links to academic challenges, social isolation, and emotional disturbances [7-9]. However, this focus on negative aspects might overlook a significant subset of youth: those who engage in these activities nonpathologically, which can even present some advantages during adolescence.

Evidence suggests that gaming and gambling are not inherently detrimental. In fact, under specific conditions, these activities can foster skill development and have a positive impact on mental well-being [10-12]. Therefore, distinguishing between nonpathological gamers and gamblers and those who abstain can offer insights into factors promoting healthier digital engagement.

Given this context, our study seeks to understand how sociodemographic, academic, and emotional/behavioral factors influence nonpathological video gaming and/or gambling, compared to nonparticipation, among adolescent students.

Method

Study design

The present work belongs to a larger cross-sectional study, based on information from various sources in Brescia, Lombardy's second largest city in northern Italy. The rationale and details of the larger study are elaborated in the study protocol [13]. The study was carried out in ten secondary schools, with an even split between the first grade (termed "middle schools," catering to students aged 11-14) and the second grade institutions ("high schools," catering to students aged 14-19). Members of our research team conducted informative seminars at each school to educate potential students about the study. Following these presentations, we sought and secured the informed consent of parents or legal guardians, thus allowing their children to participate in our study. Data were

collected through a single online questionnaire completed by adolescents during school time. The LimeSurvey platform facilitated this process and data collection.

Sample Characteristics

This study included 477 adolescents, distributed as follows: 21% (n = 101) in eighth grade, 9% (n = 42) in ninth grade, 14% (n = 68) in tenth grade, 16% (n = 74) in eleventh grade, 21% (n = 100) in the twelfth grade, and 19% (n = 92) in a post-senior year equivalent. The median age was 16 years (IQR = 16–18), with females making up 70% (n = 333) of the sample. All participants included in this study article had no gaming or gambling disorders (data on disordered gamers and gamblers have been published elsewhere [14]). Using the YSR scores, we found that 71% (n = 357) exhibited normal behavior levels, while 11% (n = 56) were borderline and 18% (n = 93) fell into the clinical range. Table 1 details sociodemographic, academic, and emotional-behavioral characteristics, whereas Table 2 details the clinical characteristics of participants.

Measurement

Sociodemographic Factors

Information on adolescent sex, age, place of residence and its attributes, family structure, and parent's education and occupation were collected using a data form specifically developed for this study.

Social Factors

The *Loneliness Scale* (LS) [16], composed of six statements and rated as "yes," "more or less," or "no," is intended to gauge emotional, social, and overall feelings of loneliness. A higher score indicates a higher perceived level of loneliness. The Italian version of the LS demonstrated reliability, exhibiting a Cronbach's α between .78 and .92 [17-18].

Emotional/Behavioral Factors

The *Youth Self-Report* (YSR) is a 119-item self-report scale for youth aged 11-18. It is part of the *Achenbach System of Empirically Based Assessment* [19-20], a consolidated platform for a multi-informant evaluation of behavioral, emotional, and social issues, along with the adaptive skills in youth. The YSR is structured with a problem section where items are evaluated on a scale: "Not True," "Somewhat or Sometimes True," or "Very or Often True." It yields eight syndrome scales: anxiety/depression, withdrawal/depression, and somatic complaints (collectively identified as internalizing or emotional difficulties); rule-violating conduct and

Table 1. Sociodemographic, educational, and family characteristics of participants.

Characteristics	Whole sample (*N* = 477)	**Gaming** Gamer (*n* = 269)	Non-gamer (*n* = 208)	*p-value*	**Gambling** Gambler (*n* = 101)	Non-gambler (*n* = 376)	*p-value*	**Gaming and gambling** Gamer and Gambler (*n* = 78)	Non-gamer and non-gambler (*n* = 399)	*p-value*
Sociodemographic characteristics										
Age				0.1			0.03			0.08
Median (IQR)	16 (14, 18)	16 (14, 17)	16 (15, 18)		17 (15, 18)	16 (14, 17)		17 (15, 18)	16 (14, 17)	
Gender				<0.001			<0.001			<0.001
Male	144 (30%)	128 (48%)	16 (8%)		50 (50%)	94 (25%)		46 (59%)	98 (25%)	
Female	333 (70%)	141 (52%)	192 (92%)		51 (50%)	282 (75%)		32 (41%)	301 (75%)	
Nationality				0.01			0.7			0.8
Italian	443 (93%)	257 (96%)	186 (89%)		93 (92%)	350 (93%)		73 (94%)	370 (93%)	
Foreign	34 (7%)	12 (5%)	22 (11%)		8 (8%)	26 (7%)		5 (6%)	29 (7%)	
Place of residence				0.03			0.7			0.4
Downtown	81 (17%)	38 (14%)	43 (21%)		19 (19%)	62 (16%)		14 (18%)	67 (17%)	
Suburbs	130 (27%)	66 (25%)	64 (31%)		24 (24%)	106 (28%)		16 (21%)	114 (29%)	
Countryside	106 (22%)	59 (22%)	47 (23%)		20 (20%)	86 (23%)		17 (22%)	89 (22%)	
Mountain	76 (16%)	51 (19%)	25 (12%)		16 (16%)	60 (16%)		12 (15%)	64 (16%)	
Lake	84 (18%)	55 (20%)	29 (14%)		22 (22%)	62 (16%)		19 (24%)	65 (16%)	
Presence of recreation places near home				>0.9			0.05			0.1
No	28 (6%)	16 (6%)	12 (6%)		10 (10%)	18 (5%)		8 (10%)	20 (5%)	
Yes	449 (94%)	253 (94%)	196 (94%)		91 (90%)	358 (95%)		70 (90%)	379 (95%)	
Educational characteristics										
School type				<0.001			0.6			0.7
First grade	101 (21%)	72 (27%)	29 (14%)		23 (23%)	78 (21%)		19 (24%)	82 (21%)	
High school	138 (29%)	82 (30%)	56 (27%)		23 (23%)	115 (31%)		18 (23%)	120 (30%)	
Technical Institute	103 (22%)	56 (21%)	47 (23%)		24 (24%)	79 (21%)		17 (22%)	86 (22%)	
Professional Institute	131 (27%)	58 (22%)	73 (35%)		30 (30%)	101 (27%)		24 (31%)	107 (27%)	
Other	4 (1%)	1 (0%)	3 (1%)		1 (1%)	3 (1%)		0 (0%)	4 (1%)	
School grade-level				0.004			0.002			0.06
Eighth grade	101 (21%)	71 (26%)	30 (14%)		23 (23%)	78 (21%)		18 (23%)	83 (21%)	
Ninth grade	42 (9%)	19 (7%)	23 (11%)		2 (2%)	40 (11%)		2 (3%)	40 (10%)	
Tenth grade	68 (14%)	29 (11%)	39 (19%)		9 (9%)	59 (16%)		7 (9%)	61 (15%)	
Eleventh grade	74 (16%)	46 (17%)	28 (13%)		21 (21%)	53 (14%)		16 (21%)	58 (15%)	
Twelfth grade	100 (21%)	57 (21%)	43 (21%)		17 (17%)	83 (22%)		14 (18%)	86 (22%)	
Post-senior year equivalent	92 (19%)	47 (17%)	45 (22%)		29 (29%)	63 (17%)		21 (27%)	71 (18%)	
History of school failure				0.3			0.6			0.3
No	414 (87%)	237 (88%)	177 (85%)		86 (85%)	328 (87%)		65 (83%)	349 (87%)	
Yes	63 (13%)	32 (12%)	31 (15%)		15 (15%)	48 (13%)		13 (17%)	50 (13%)	
Family characteristics										
Primary caregiver during the first three years of life				0.5			0.1			0.07
Parent(s)	420 (88%)	242 (90%)	178 (86%)		85 (84%)	335 (89%)		64 (82%)	356 (89%)	
Grandparent(s)	30 (6%)	15 (6%)	15 (7%)		10 (10%)	20 (5%)		8 (10%)	22 (6%)	
Nursery school or Babysitter	17 (4%)	7 (3%)	10 (5%)		2 (2%)	15 (4%)		2 (3%)	15 (4%)	
Other	10 (2%)	5 (2%)	5 (2%)		4 (4%)	6 (2%)		4 (5%)	6 (2%)	
Who do you live with?				0.7			0.1			0.08
Natural family	399 (84%)	226 (84%)	173 (83%)		83 (82%)	316 (84%)		62 (79%)	337 (84%)	
Adoptive family	4 (1%)	2 (1%)	2 (1%)		2 (2%)	2 (1%)		1 (1%)	3 (1%)	
With a parent and his/her partner	22 (5%)	14 (5%)	8 (4%)		8 (8%)	14 (4%)		8 (10%)	14 (4%)	

With a single parent	48 (10%)	26 (10%)	22 (11%)		7 (7%)	41 (11%)		6 (8%)	42 (11%)	
Other	4 (1%)	1 (0%)	3 (1%)		1 (1%)	3 (1%)		1 (1%)	3 (1%)	
Father's education				0.07			0.6			0.3
None	13 (3%)	8 (3%)	5 (3%)		3 (3%)	10 (3%)		3 (4%)	10 (3%)	
Primary school	19 (4%)	7 (3%)	12 (6%)		2 (2%)	17 (5%)		1 (1%)	18 (5%)	
Middle school	164 (35%)	83 (31%)	81 (40%)		36 (36%)	128 (35%)		26 (34%)	138 (35%)	
Professional qualification	80 (17%)	44 (17%)	36 (18%)		12 (12%)	68 (18%)		8 (11%)	72 (18%)	
High school	135 (29%)	84 (32%)	51 (25%)		32 (32%)	103 (28%)		26 (34%)	109 (28%)	
College or higher	58 (12%)	39 (15%)	19 (9%)		14 (14%)	44 (12%)		12 (16%)	46 (12%)	
(Missing)	8	4	4		2	6		2	6	
Mother's education				0.1			0.3			0.4
None	14 (3%)	7 (3%)	7 (3%)		1 (1%)	13 (4%)		1 (1%)	13 (3%)	
Primary school	7 (2%)	2 (1%)	5 (2%)		2 (2%)	5 (1%)		1 (1%)	6 (2%)	
Middle school	123 (26%)	56 (21%)	67 (33%)		21 (21%)	102 (27%)		16 (21%)	107 (27%)	
Professional qualification	78 (17%)	42 (16%)	36 (17%)		19 (19%)	59 (16%)		15 (20%)	63 (16%)	
High school	172 (37%)	105 (40%)	67 (33%)		34 (35%)	138 (37%)		25 (33%)	147 (37%)	
College or higher	75 (16%)	51 (19%)	24 (12%)		21 (21%)	54 (15%)		17 (23%)	58 (15%)	
(Missing)	8	6	2		3	5		3	5	
Father's occupation				0.2			0.3			0.6
Unqualified employee	32 (7%)	19 (8%)	13 (7%)		9 (9%)	23 (7%)		7 (10%)	25 (7%)	
Qualified employee	104 (23%)	67 (27%)	37 (19%)		19 (20%)	85 (24%)		16 (22%)	88 (24%)	
Professional	293 (66%)	155 (62%)	138 (71%)		68 (70%)	225 (65%)		50 (68%)	243 (66%)	
Other	15 (3%)	9 (4%)	6 (3%)		1 (1%)	14 (4%)		1 (1%)	14 (4%)	
(Missing)	33	19	14		4	29		4	29	
Mother's occupation				0.3			0.2			0.1
Unqualified employee	107 (24%)	56 (22%)	51 (26%)		22 (23%)	85 (24%)		19 (26%)	88 (23%)	
Qualified employee	155 (34%)	95 (37%)	60 (30%)		37 (39%)	118 (33%)		28 (38%)	127 (33%)	
Professional	59 (13%)	35 (14%)	24 (12%)		16 (17%)	43 (12%)		13 (18%)	46 (12%)	
Other	132 (29%)	68 (27%)	64 (32%)		20 (21%)	112 (31%)		13 (18%)	119 (31%)	
(Missing)	24	15	9		6	18		5	19	
Frequency of receiving money from parents				0.2			0.8			0.7
Monthly	40 (8%)	17 (6%)	23 (11%)		8 (8%)	32 (9%)		5 (6%)	35 (9%)	
Weekly	69 (14%)	41 (15%)	28 (13%)		15 (15%)	54 (14%)		12 (15%)	57 (14%)	
No regular cadence	286 (60%)	160 (59%)	126 (61%)		64 (63%)	222 (59%)		50 (64%)	236 (59%)	
Never	82 (17%)	51 (19%)	31 (15%)		14 (14%)	68 (18%)		11 (14%)	71 (18%)	
Average monthly amount received				0.2			0.2			0.1
Any money	15 (4%)	8 (4%)	7 (4%)		3 (3%)	12 (4%)		2 (3%)	13 (4%)	
Less than 5 euros	9 (2%)	6 (3%)	3 (2%)		0 (0%)	9 (3%)		0 (0%)	9 (3%)	
5-10 euros	78 (20%)	39 (18%)	39 (22%)		12 (14%)	66 (21%)		8 (12%)	70 (21%)	
10-20 euros	121 (31%)	73 (33%)	48 (27%)		27 (31%)	94 (31%)		20 (30%)	101 (31%)	
20-50 euros	113 (29%)	67 (31%)	46 (26%)		32 (37%)	81 (26%)		28 (42%)	85 (26%)	
More than 50 euros	59 (15%)	25 (11%)	34 (19%)		13 (15%)	46 (15%)		9 (13%)	50 (15%)	
(Missing)	82	51	31		14	68		11	71	

Note: Sum of percentages may not add up to 100% due to rounding.

Table 2. Clinical characteristics of participants

Characteristics	Whole sample (*N* = 477)	Gaming: Gamer (*n* = 269)	Gaming: Non-gamer (*n* = 208)	Gaming: *p-value*	Gambling: Gambler (*n* = 101)	Gambling: Non-gambler (*n* = 376)	Gambling: *p-value*	Gaming and gambling: Gamer and Gambler (*n* = 78)	Gaming and gambling: Non-gamer and non-gambler (*n* = 399)	Gaming and gambling: *p-value*
YSR Syndrome scales										
Anxiety/depression	7 (3, 10)	6 (3, 10)	7 (4, 11)	0.02	6 (2, 10)	7 (4, 11)	0.08	6 (2, 9)	7 (3, 11)	0.05
(Missing)	8	3	5		4	4		2	6	
Withdrawal/depression	4 (1, 6)	4 (2, 6)	4 (1, 6.5)	0.9	3 (1, 6)	4 (2, 6)	0.1	3 (1, 6)	4 (2, 6)	0.3
(Missing)	8	3	5		4	4		2	6	
Somatic complaints	3 (2, 6)	3 (1, 5)	4 (2, 7)	0.01	3 (2, 5)	3 (2, 6)	0.6	3 (1.75, 5.25)	3 (2, 6)	0.8
(Missing)	8	3	5		4	4		2	6	
Social problems	3 (1, 5)	3 (1, 5)	3 (1, 5)	0.4	3 (2, 5)	3 (1, 5)	0.8	3 (2, 5)	3 (1, 5)	0.4
(Missing)	8	3	5		4	4		2	6	
Thought problems	2 (1, 6)	2 (1, 6)	2 (1, 5.25)	0.8	2 (1, 6)	2 (1, 6)	0.7	2 (1, 6)	2 (1, 5)	0.8
Attention problems	5 (3, 8)	5 (3, 7)	6 (3, 8)	0.4	5 (3, 8)	5 (3, 8)	0.4	5 (3, 8)	5 (3, 8)	0.9
Rule-Breaking Behavior	3 (1, 5)	3 (1, 5)	3 (1, 5.5)	0.6	4 (2, 7)	3 (1, 5)	0.003	4 (2, 7.25)	3 (1, 5)	<0.001
(Missing)	8	3	5		4	4		2	6	
Aggressive conduct	6 (4, 10)	6 (4, 9)	7 (4, 10)	0.2	7 (5, 11)	6 (4, 9.25)	0.03	7 (5, 11)	6 (4, 10)	0.02
(Missing)	8	3	5		4	4		2	6	
Other Problems	4 (2, 6)	4 (2, 6)	4 (2, 6)	0.5	4 (2, 6)	4 (2, 6)	>0.9	4 (2, 6)	4 (2, 6)	0.9
(Missing)	8	3	5		4	4		2	6	
De Jong Gierveld Loneliness Scale										
Emotional loneliness				0.6			>0.9			0.7
Median (IQR)	1 (1, 3)	1 (1, 3)	1 (1, 3)		1 (1, 2)	1 (1, 3)		2 (1, 3)	1 (1, 3)	
(Missing)	8	3	5		4	4		2	6	
Social loneliness				0.1			0.3			0.6
Median (IQR)	1 (0, 2)	1 (0, 2)	1 (0, 2)		1 (0, 2)	1 (0, 2)		1 (0, 2)	1 (0, 2)	
(Missing)	8	3	5		4	4		2	6	
Total loneliness				0.3			0.5			>0.9
Median (IQR)	3 (1, 4)	3 (1, 4)	2 (1, 4)		3 (1, 4)	3 (1, 4)		3 (1, 4)	3 (1, 4)	
(Missing)	8	3	5		4	4		2	6	
Gaming/Gambling habits				<0.001			<0.001			
No habits	376 (79%)	191 (71%)	185 (89%)		23 (23%)	185 (49%)				
Habits	101 (21%)	78 (29%)	23 (11%)		78 (77%)	191 (51%)				

aggressive conduct (collectively deemed externalizing or behavioral issues); along with social, cognitive, and attention problems. By aggregating the problem items, scores for internalizing, externalizing, and total problems can be computed. The Italian version of the YSR exhibits robust internal validity with Cronbach's α ranging from .71 to .95 [21].

Exposure variables

The *Video-Gaming Scale for Adolescents* (VGS-A) [22] is a self-report measure that assesses the use of video games by adolescents and possible pathological gaming behaviors. The first part includes three unmarked items investigating video gaming habits, such as the frequency of playing different game genres in the past year, the devices utilised, and time spent on each, as well as a preference for online or offline gaming. The second part comprises nine items evaluated on a three-level scale: "never," "sometimes," and "often," aligned with the DSM-5 diagnostic criteria for pathological gaming. Pathological gaming severity is gauged by the nine-item symptom severity ratings. The VGS-A exhibited a Cronbach α of .71 [23], which is considered acceptable.

The *Gambling Behavior Scale for Adolescents* (GBS-A) [24] is a self-administered questionnaire that measures gambling activities among adolescents. The first part contains four non-scored items, which delve into the frequency of involvement in diverse gambling activities, the onset age of gambling, presence of gambling companions, frequency of gambling with them, and the monetary investment in different gambling activities over the past year. The second part encompasses nine items on a three-point scale: "never," "sometimes," or "often," corresponding to the DSM-5 diagnostic criteria for gambling disorders. GBS-A categorizes respondents as nonproblem gamblers, at-risk gamblers, or disordered gamblers. The scale demonstrated a Cronbach α of .77 [25].

The *Real Money Games* (RMG) is a 16-item self-report inventory specifically developed for this study to capture the frequency and duration of participation in real money games (both online and offline) over the past year, offering insights on the locations of play, the devices used, and the amount of money wagered.

Statistical analysis

For the sake of the analyses, the VGS-A and GBS-A scores assessing adolescent's use of video games and gambling have been categorized into two levels, i.e., nonpathological gamers (not problematic or at risk) and non-gamers. The two scores have been combined to define the cooccurrence of nonpathological video gaming and gambling as a separate outcome.

Categorical variables are described in terms of absolute and relative frequencies and compared across gamers and non-gamers through the Chi-squared test, or the exact Fisher test when expected frequencies were less than 5. Continuous variables are summarized by median and interquartile range

(IQR) and, given the absence of normality for most of the considered variables, compared across gamers and non-gamers through the non-parametric Mann-Whitney test for independent samples.

The strength of the magnitude between selected risk factors and nonpathological video gaming, gambling and cooccurrence of the two was quantified through odds ratios (ORs) as estimated by univariate logistic regression models. Multivariate logistic regression models were then fitted to assess the independent role of selected adolescents' characteristics, including age, sex, residence zone, type of attended school and YSR syndromic subscales.

The type I error α was set to 5%. All the analyses have been carried out in R version 4.2.1.

Results

Prevalence of nonpathological video gaming and gambling

Of the participants, 56% (n = 269) engaged in video gaming, with 29% (n = 78) of these also participating in gambling. Conversely, 21% (n = 101) were exclusively involved in gambling, and 77% (n = 78) of this group also played video games. Among the gamers, 26% (n = 70) were considered at-risk gamers, while among the gamblers, 6% (n = 6) were considered at-risk gamblers The proportion of participants not engaging in either activity was 39% (n = 185).

Independent Variables Influences

Table 3 provides odd ratios, confidence intervals, and p-values obtained from univariate logistic regression analyses. These results elucidate the relationship between sociodemographic, academic, and emotional/behavioral factors and nonpathological gaming and gambling behaviors in adolescents. A notable positive association was found between video gaming and gambling habits.

Table 3. Associations between sociodemographic, educational, family, and clinical characteristics and gaming/gambling habits.

		Gaming		**Gambling**		**Gaming and gambling**	
Characteristic	Obs.	OR (95% CI[1])	*p-value*	OR (95% CI[1])	*p-value*	OR (95% CI[1])	*p-value*
Sociodemographic characteristics							
Age	477	0.92 (0.84, 1.02)	0.1	1.12 (1, 1.26)	0.05	1.11 (0.98, 1.27)	0.11
Gender	477		<0.001		<0.001		<0.001
Male		—		—		—	
Female		0.09 (0.05, 0.16)	<0.001	0.34 (0.22, 0.54)	<0.001	0.23 (0.14, 0.37)	<0.001
Nationality	477		0.01		0.7		0.8
Italian		—		—		—	
Foreign		0.39 (0.18, 0.80)	0.01	1.16 (0.48, 2.54)	0.7	0.87 (0.29, 2.15)	0.8
Place of residence	477		0.03		0.7		0.4
Downtown		—		—		—	
Suburbs		1.17 (0.67, 2.04)	0.6	0.74 (0.38, 1.47)	0.4	0.67 (0.31, 1.48)	0.3
Countryside		1.42 (0.80, 2.55)	0.2	0.76 (0.37, 1.55)	0.4	0.91 (0.42, 2.01)	0.8
Mountain		2.31 (1.22, 4.45)	0.01	0.87 (0.41, 1.85)	0.7	0.90 (0.38, 2.09)	0.8
Lake		2.15 (1.15, 4.05)	0.02	1.16 (0.57, 2.37)	0.7	1.40 (0.65, 3.07)	0.4
Presence of recreation places near home	477		>0.9		0.07		0.09
No		—		—		—	
Yes		0.97 (0.44, 2.08)	>0.9	0.46 (0.21, 1.06)	0.06	0.46 (0.20, 1.15)	0.08
Educational characteristics							
School type	477		<0.001		0.7		0.5
First grade		—		—		—	
High school		0.59 (0.34, 1.02)	0.06	0.68 (0.35, 1.30)	0.2	0.65 (0.32, 1.31)	0.2
Technical Institute		0.48 (0.27, 0.85)	0.01	1.03 (0.54, 1.98)	>0.9	0.85 (0.41, 1.76)	0.7
Professional Institute		0.32 (0.18, 0.55)	<0.001	1.01 (0.54, 1.88)	>0.9	0.97 (0.50, 1.90)	>0.9

Other		0.13 (0.01, 1.10)	0.09	1.13 (0.05, 9.32)	>0.9	Not estimable	>0.9
School grade-level	477		0.003		<0.001		0.03
Eighth grade		—		—		—	
Ninth grade		0.35 (0.16, 0.73)	0.01	0.17 (0.03, 0.61)	0.02	0.23 (0.04, 0.85)	0.06
Tenth grade		0.31 (0.16, 0.59)	<0.001	0.52 (0.21, 1.17)	0.1	0.53 (0.20, 1.30)	0.2
Eleventh grade		0.69 (0.37, 1.31)	0.3	1.34 (0.67, 2.68)	0.4	1.27 (0.59, 2.70)	0.5
Twelfth grade		0.56 (0.31, 1.00)	0.05	0.69 (0.34, 1.39)	0.3	0.75 (0.35, 1.60)	0.5
Post-senior year equivalent		0.44 (0.24, 0.79)	0.01	1.56 (0.83, 2.98)	0.2	1.36 (0.67, 2.78)	0.4
History of school failure	477		0.3		0.6		0.3
No		—		—		—	
Yes		0.77 (0.45, 1.31)	0.3	1.19 (0.62, 2.18)	0.6	1.40 (0.69, 2.65)	0.3
Family							
Primary caregiver during the first three years of life	477		0.5		0.1		0.1
Parent(s)		—		—		—	
Grandparent(s)		0.74 (0.35, 1.55)	0.4	1.97 (0.86, 4.28)	0.1	2.02 (0.82, 4.58)	0.1
Nursery school or Babysitter		0.51 (0.18, 1.37)	0.2	0.53 (0.08, 1.91)	0.4	0.74 (0.12, 2.71)	0.7
Other		0.74 (0.20, 2.68)	0.6	2.63 (0.66, 9.40)	0.1	3.71 (0.93, 13.3)	0.05
Who do you live with?	477		0.7		0.2		0.2
Natural family		—		—		—	
Adoptive family		0.77 (0.09, 6.43)	0.8	3.81 (0.45, 32.1)	0.2	1.81 (0.09, 14.4)	0.6
With a parent and his/her partn		1.34 (0.56, 3.42)	0.5	2.18 (0.84, 5.26)	0.09	3.11 (1.20, 7.57)	0.02
With a single parent		0.90 (0.50, 1.66)	0.7	0.65 (0.26, 1.42)	0.3	0.78 (0.29, 1.78)	0.6
Other		0.26 (0.01, 2.01)	0.2	1.27 (0.06, 10.1)	0.8	1.81 (0.09, 14.4)	0.6
Father's education	469		0.07		0.5		0.2
None		—		—		—	
Primary school		0.36 (0.08, 1.52)	0.2	0.39 (0.05, 2.75)	0.3	0.19 (0.01, 1.66)	0.2
Middle school		0.64 (0.19, 2.00)	0.5	0.94 (0.27, 4.34)	>0.9	0.63 (0.18, 2.94)	0.5
Professional qualification		0.76 (0.21, 2.49)	0.7	0.59 (0.15, 2.90)	0.5	0.37 (0.09, 1.90)	0.2
High school		1.03 (0.30, 3.26)	>0.9	1.04 (0.30, 4.82)	>0.9	0.80 (0.22, 3.73)	0.7
College or higher		1.28 (0.35, 4.39)	0.7	1.06 (0.28, 5.22)	>0.9	0.87 (0.22, 4.32)	0.8
Mother's education	469		0.01		0.3		0.4
None		—		—		—	
Primary school		0.40 (0.05, 2.59)	0.4	5.20 (0.41, 128)	0.2	2.17 (0.08, 61.4)	0.6
Middle school		0.84 (0.27, 2.58)	0.8	2.68 (0.49, 49.9)	0.4	1.94 (0.35, 36.5)	0.5
Professional qualification		1.17 (0.37, 3.71)	0.8	4.19 (0.76, 78.5)	0.2	3.10 (0.55, 58.4)	0.3
High school		1.57 (0.51, 4.77)	0.4	3.20 (0.61, 59.2)	0.3	2.21 (0.41, 41.0)	0.5
College or higher		2.12 (0.66, 6.88)	0.2	5.06 (0.92, 94.7)	0.1	3.81 (0.68, 71.7)	0.2
Father's occupation	444		0.2		0.2		0.6
Unqualified employee		—		—		—	
Qualified employee		1.24 (0.54, 2.78)	0.6	0.57 (0.23, 1.48)	0.2	0.65 (0.25, 1.85)	0.4
Professional		0.77 (0.36, 1.60)	0.5	0.77 (0.35, 1.83)	0.5	0.73 (0.32, 1.92)	0.5
Other		1.03 (0.30, 3.72)	>0.9	0.18 (0.01, 1.13)	0.1	0.26 (0.01, 1.65)	0.2
Mother's occupation	453		0.3		0.2		0.09
Unqualified employee		—		—		—	
Qualified employee		1.44 (0.88, 2.38)	0.2	1.21 (0.67, 2.23)	0.5	1.02 (0.54, 1.97)	>0.9
Professional		1.33 (0.70, 2.54)	0.4	1.44 (0.68, 3.01)	0.3	1.31 (0.58, 2.87)	0.5
Other		0.97 (0.58, 1.61)	0.9	0.69 (0.35, 1.35)	0.3	0.51 (0.23, 1.07)	0.08
Frequency of receiving money from parents	477		0.2		0.8		0.7
Monthly		—		—		—	
Weekly		1.98 (0.90, 4.42)	0.09	1.11 (0.43, 3.03)	0.8	1.47 (0.50, 4.95)	0.5
Without fixed cadence		1.72 (0.88, 3.40)	0.1	1.15 (0.53, 2.80)	0.7	1.48 (0.60, 4.48)	0.4
Never		2.23 (1.04, 4.87)	0.04	0.82 (0.32, 2.24)	0.7	1.08 (0.36, 3.66)	0.9
Average monthly amount received	395		0.2		0.1		0.05
Any money		—		—		—	
Less than 5 euros		1.75 (0.32, 10.9)	0.5	Not estimable	>0.9	Not estimable	>0.9
5-10 euros		0.87 (0.28, 2.67)	0.8	0.73 (0.19, 3.53)	0.7	0.74 (0.16, 5.29)	0.7
10-20 euros		1.33 (0.44, 3.94)	0.6	1.15 (0.34, 5.31)	0.8	1.29 (0.32, 8.64)	0.8
20-50 euros		1.27 (0.42, 3.79)	0.7	1.58 (0.46, 7.27)	0.5	2.14 (0.55, 14.2)	0.3
More than 50 euros		0.64 (0.20, 2.02)	0.4	1.13 (0.30, 5.50)	0.9	1.17 (0.26, 8.29)	0.9
Clinical characteristics							
Youth Self Report syndromes							
Anxiety/depression	469	0.96 (0.93, 1.00)	0.03	0.97 (0.92, 1.01)	0.1	0.95 (0.91, 1.00)	0.06
Withdrawal/depression	469	0.99 (0.94, 1.05)	0.8	0.96 (0.89, 1.03)	0.2	0.97 (0.89, 1.04)	0.4
Somatic complaints	469	0.94 (0.89, 1.00)	0.04	0.99 (0.92, 1.05)	0.7	1.00 (0.93, 1.07)	>0.9
Social problems	469	1.03 (0.97, 1.09)	0.3	1.03 (0.96, 1.10)	0.4	1.05 (0.97, 1.12)	0.2
Thought problems	477	1.02 (0.97, 1.07)	0.5	1.01 (0.95, 1.07)	0.7	1.03 (0.97, 1.10)	0.3
Attention problems	477	0.98 (0.93, 1.04)	0.5	0.97 (0.91, 1.04)	0.5	1.00 (0.93, 1.08)	>0.9
Rule-Breaking Behavior	469	0.99 (0.94, 1.04)	0.6	1.10 (1.04, 1.16)	0.001	1.12 (1.05, 1.19)	<0.001
Aggressive conduct	469	0.98 (0.95, 1.02)	0.4	1.06 (1.01, 1.11)	0.02	1.07 (1.01, 1.12)	0.01
Other Problems	469	0.97 (0.91, 1.04)	0.4	1.02 (0.94, 1.10)	0.7	1.03 (0.94, 1.12)	0.5
Loneliness Scale	469						
Emotional loneliness		1.04 (0.88, 1.23)	0.6	0.99 (0.81, 1.22)	>0.9	1.04 (0.83, 1.30)	0.7
Social loneliness		1.10 (0.94, 1.28)	0.2	0.88 (0.73, 1.07)	0.2	0.93 (0.75, 1.14)	0.5
Total loneliness		1.05 (0.95, 1.16)	0.3	0.95 (0.84, 1.07)	0.4	0.98 (0.86, 1.12)	0.8

Gaming/Gambling habits	477		<0.001			<0.001
No habits		—		—		
Habits		3.28 (2.01, 5.56)	<0.001	3.28 (2.01, 5.56)		<0.001

Note. Obs. = observations, OR = Odds Ratio, CI = Confidence Interval.

Sociodemographic Factors

- Female adolescents showed a lower propensity for video games, gambling, or both activities.
- Non-Italian adolescents had reduced involvement in video games, but not in gambling activities.
- Adolescents who did not receive a parental allowance were more inclined to become video gamers.
- The geographical context was influential: those living in mountainous areas or near lakes had a higher predilection for video gaming or gambling alone, compared to their urban counterparts.

Emotional-Behavioral Factors

- Higher scores in anxiety/depression and social problems on the YSR were negatively correlated with both gaming and gambling behaviors.
- Adolescents with elevated rule-breaking or aggressive behaviors, as indicated by the YSR, were more likely to engage in gambling alone or in combination with video games.

Academic Factors

- Ninth-grade students, relative to their eighth-grade peers, showed markedly lower participation in gambling.
- High school students, compared to middle school students, were less prone to video gaming.
- Students in technical or vocational schools showed reduced participation in video games and the joint activity of gaming and gambling, compared to students in middle school. This pattern was also observed among academic high school students for what concerned the concomitant habits of video gaming and gambling.

Multiple Variables Influences

Table 4 presents the odds ratios, confidence intervals, and p-values of three multivariate adjusted regression models examining (A) video gaming, (B) gambling, and (C) participation in both activities.

Table 4. Adjusted odds ratios and confidence intervals of the associations with sociodemographic, educational, family, and clinical characteristics.

Characteristics	**Gamer vs. Non-gamer**		**Gambler vs. Non-gambler**		**Gamer and Gambler vs. Non-gamer and Non-gambler**	
	aOR (95% CI)	*p-value*	aOR (95% CI)	*p-value*	aOR (95% CI)	*p-value*
Sociodemographic characteristics						
Age	1.05 (0.87, 1.27)	0.6	1.29 (1.03, 1.62)	0.03	1.28 (0.99, 1.67)	0.06

Gender		<0.001		0.03		<0.001
Male	1.00 —		1.00 —		1.00 —	
Female	0.09 (0.04, 0.17)		0.52 (0.28, 0.95)	0.03	0.25 (0.13, 0.47)	<0.001
Nationality		<0.001		0.9		0.2
Italian	1.00 —		1.00 —		1.00 —	
Foreign	0.14 (0.04, 0.45)	0.001	0.92 (0.25, 2.97)	0.9	0.38 (0.07, 1.46)	0.2
Place of residence		0.8		0.3		0.4
Downtown	1.00 —		1.00 —		1.00 —	
Suburbs	1.38 (0.66, 2.90)	0.4	0.75 (0.34, 1.67)	0.5	0.71 (0.29, 1.76)	0.5
Countryside	1.50 (0.68, 3.32)	0.3	0.42 (0.17, 1.01)	0.05	0.46 (0.17, 1.23)	0.1
Mountain	1.66 (0.68, 4.12)	0.3	0.97 (0.37, 2.53)	>0.9	0.97 (0.33, 2.83)	>0.9
Lake	1.42 (0.61, 3.34)	0.4	0.88 (0.37, 2.09)	0.8	1.10 (0.44, 2.83)	0.8
Educational characteristics						
School level		0.01		0.3		0.2
First grade	1.00 —		1.00 —		1.00 —	
High school	0.34 (0.13, 0.86)	0.02	0.36 (0.11, 1.15)	0.09	0.36 (0.09, 1.31)	0.13
Technical Institute	0.35 (0.13, 0.93)	0.04	0.75 (0.23, 2.34)	0.6	0.58 (0.15, 2.13)	0.4
Professional Institute	0.38 (0.14, 1.07)	0.07	0.67 (0.20, 2.25)	0.5	0.73 (0.18, 2.86)	0.7
Other	0.02 (0.00, 0.27)	0.01	1.96 (0.08, 21.2)	0.6	Not estimable	>0.9
Family characteristics						
Higher educational qualification of parents		0.7		0.3		0.2
None	1.00 —		1.00 —		1.00 —	
Primary school	0.36 (0.04, 2.55)	0.3	0.77 (0.07, 8.85)	0.8	0.39 (0.02, 5.25)	0.5
Middle school	0.65 (0.11, 3.26)	0.6	1.54 (0.30, 12.2)	0.6	0.84 (0.16, 6.49)	0.8
Professional qualification	0.98 (0.16, 5.18)	>0.9	0.87 (0.15, 7.09)	0.9	0.47 (0.08, 3.91)	0.4
High school	0.72 (0.12, 3.67)	0.7	2.11 (0.40, 16.7)	0.4	1.53 (0.30, 11.7)	0.6
College or higher	0.91 (0.14, 5.22)	>0.9	2.11 (0.36, 18.0)	0.4	1.33 (0.22, 11.2)	0.8
Higher occupation of parents		>0.9		0.2		0.5
Unqualified employee	1.00 —		1.00 —		1.00 —	
Qualified employee	0.77 (0.26, 2.22)	0.6	0.45 (0.15, 1.41)	0.2	0.51 (0.15, 1.87)	0.3
Professional	0.75 (0.28, 1.99)	0.6	0.72 (0.27, 2.03)	0.5	0.71 (0.24, 2.38)	0.6
Other	0.65 (0.12, 3.54)	0.6	0.17 (0.02, 1.06)	0.08	0.26 (0.03, 1.83)	0.2
Clinical characteristics						
Youth Self Report syndromes						
Anxiety/depression	0.92 (0.86, 0.99)	0.03	0.97 (0.89, 1.06)	0.5	0.91 (0.82, 1.00)	0.05
Withdrawal/depression	1.02 (0.91, 1.13)	0.8	0.94 (0.83, 1.06)	0.3	0.96 (0.84, 1.10)	0.6
Somatic complaints	1.01 (0.92, 1.11)	0.8	1.04 (0.93, 1.16)	0.5	1.08 (0.96, 1.22)	0.2
Social problems	1.16 (1.03, 1.31)	0.02	1.06 (0.93, 1.22)	0.4	1.16 (1.00, 1.35)	0.05
Thought problems	1.04 (0.94, 1.14)	0.5	0.99 (0.89, 1.10)	0.9	1.00 (0.89, 1.12)	>0.9
Attention problems	0.96 (0.88, 1.06)	0.4	0.96 (0.87, 1.06)	0.5	0.97 (0.87, 1.09)	0.6
Rule-breaking behavior	0.97 (0.88, 1.07)	0.5	1.10 (0.99, 1.22)	0.06	1.11 (0.99, 1.24)	0.06
Aggressive conduct	0.99 (0.92, 1.07)	0.9	1.07 (0.98, 1.16)	0.13	1.07 (0.97, 1.18)	0.2
Other Problems	0.98 (0.88, 1.08)	0.6	0.92 (0.82, 1.02)	0.13	0.91 (0.80, 1.03)	0.1
Loneliness scale (total score)	1.09 (0.94, 1.27)	0.3				
Gaming/Gambling habits		0.004		0.002		
No habits	1.00 —		1.00 —			
Habits	2.43 (1.32, 4.60)	0.005	2.58 (1.39, 4.90)	0.003		

Note. aOR = adjusted Odds Ratio, CI = Confidence Interval.

Model A: Video Games

Factors that make video gaming less likely included being female, of foreign (non-Italian) origin, a high school student, or having elevated levels of anxiety and depression. On the contrary, those who were gamblers or had social problems were more inclined toward video games.

Model B: Gambling

Female adolescents showed a lower likelihood of gambling. However, a higher propensity to gamble was observed among video gamers and older adolescents.

Model C: Combined Video Games and Gambling

The concomitant habits of video games and gambling were less common among women, and students with elevated levels of anxiety and depression. However, the odds were higher among adolescents with social problems.

Discussion

The current study investigates an extensive range of factors correlated with nonproblematic video games and gambling among Italian adolescent students. While adolescent video gaming and gambling have been identified as potentially significant public health concerns worldwide [26,27], much of the existing research is mainly focused on pathological involvement. Our survey aims to increase this body of knowledge by exploring the nonpathological aspects of youth participation in these activities. Specifically, our objective is to discern variations in sociodemographic, social, and emotional/behavioral factors that can influence the likelihood that adolescents participate in one or both activities without problem.

In our study, the participation of video games and gambling was higher than recently estimates for other European countries [26,28]. International studies have highlighted differences in the rates of youth gaming and gambling in various European nations, which are believed to stem from the varying ease of access and presence of these activity establishments in each country and from sociocultural differences [26,29]. Furthermore, the variation in the prevalence of video games and gambling among adolescents in European countries could be due to various methodological approaches used and the types of adolescents surveyed, such as workers or students. Today's youth have matured in an era where technological advancements have introduced novel methods of legalized gambling, such as online betting, mobile wagers, in-game gambling, and virtual gambling simulations [30,31]. In Italy, adolescents can easily access both offline and online video games, as well as gambling.

Most video gamers reported gambling within the past year, and similarly, a significant number of gamblers indicated that they played video games during the same period. This observation aligns with a study from Canada [27,32] that hinted at a convergence between occasional gambling and video gaming.

Consistently with existing literature [33], our results suggest that male adolescents are more inclined to engage in gambling practices. Some experts believe that this tendency could arise from parents promoting gambling activities more to boys than to girls [34], thus embedding these activities deeply within male culture [35]. However, more investigation is required before attributing any factors connected to adolescent video gaming or gambling (both problematic and non-problematic) as uniquely male-centric. Similarly, male adolescents were more likely to play video games, which also is consistent with the current literature [28].

Our results showed that adolescents of older age gamble more often than their younger counterparts, aligning with previous research [26,29]. This increased tendency in the older age group might be attributed to their growing independence and reduced parental supervision. Social influences

play a crucial role in adolescent gambling, and this impact could be more pronounced among older adolescents [36,37].

Previous research has highlighted how family-related aspects, such as sociodemographic characteristics and parental educational background, can substantially affect adolescent participation in video games and gambling. However, in our study, these familial factors did not appear to increase the use of video games or gambling. Notably, being from a non-Italian family was linked with a decreased likelihood of being a video gamer.

Importantly, non-problematic involvement in video games and gambling, separately or together, did not show a link with academic performance. This contrasts with widely documented research on pathological gaming and gambling, which often finds a connection with decreased academic achievement and increased school dropout rates [26,28,38].

Growing evidence has consistently established a link between problematic or potentially problematic video game use and anxiety levels [39,40], and even clinical symptoms of anxiety and depressive disorders [41]. Surprisingly, while non-problematic use of video games was indeed related to levels of anxiety and depressive symptoms, the association was inverse. It seems that the presence of these internalized difficulties might act as a deterrent against the nonpathological participation in video games. Internalizing and externalizing problems have also been linked to gambling and gambling issues in adolescents [42], however, our sample did not show any such association. Furthermore, in line with earlier research [43,44], we observed a correlation between social problems and involvement in gaming. This could suggest that individuals who experience feelings of loneliness, fear of social interactions, or isolation might turn to video games as a coping mechanism for these adverse emotions [45].

In line with the literature on problematic gaming and gambling [27], non-problematic video gamers are typically younger and more prone to depressive symptoms compared to non-problematic gamblers. Furthermore, there were negligible differences between adolescents with gaming or gambling problems and those exhibiting both behaviors.

Although they share comparable profiles, there was small overlap between gambling and video gaming.

Strengths and limitations

The chief strength of this study is its approach to examining the factors behind nonproblematic video gaming and gambling in teenage students, a topic seldom explored in previous research. While many previous studies have focused on a limited set of variables, our investigation delves into a more expansive range of determinants, including sociodemographic, social, and emotional/behavioral aspects. This holistic perspective provides a richer understanding of adolescent behavior.

Nevertheless, certain limitations warrant mention. First, due to its cross-sectional nature, this study cannot pinpoint the chronological relationship between gambling behavior and its potential precursors. Second, we based our findings on self-reported data from participants, which always carries risks, such as inaccurate recollections or responses shaded by social norms. However, the likelihood of recall bias is mitigated by the brief 1-year time frame in question. Third, our insights into video gaming and gambling habits depend exclusively on the testimony of adolescents, lacking external corroboration. Lastly, the RMG scale didn't follow all the steps recommended for the development and validation of a self-report scale [46].

Conclusion

Previous studies have highlighted similarities between gambling and video gaming, suggesting shared traits among gamblers and video game enthusiasts. Consistent with predictions, male adolescents tend to engage more in either or both activities. Contrary to expectations, higher levels of anxiety and depression reduced the likelihood of participating in video games. As expected, adolescents with social challenges showed a greater affinity for video games, while older adolescents gravitated more toward gambling. Subsequent research should delve deeper into the parallels between non-issue gambling/gaming and explore potential long-term relationships.

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