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Associations between relative deprivation and problematic gaming in adolescence: evidence from an Italian representative sample

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ABSTRACT

Background Problematic gaming is a known risk factor for adolescent well-being. Yet, socioeconomic factors that might contribute to problematic gaming in adolescence have not been fully explored. This study examined the association between relative deprivation, defined as an individual's financial gap relative to their classmates, and problematic gaming in a representative sample of Italian adolescents.

Methods We analysed data on family material assets and self-reported symptoms of problematic gaming from 58 881 participants in the 2021/2022 Italian Health Behaviour in school-aged children study. Relative deprivation was measured using the Yitzhaki index, with classmates as a social reference group. Associations with problematic gaming were tested using a two-level multiple logistic regression model while accounting for the effects of economic, sociodemographic and psychological factors.

Results Adolescents reporting higher relative deprivation were eight times more likely to be classified as problematic gamers compared with their better-off peers, after controlling for individual and class-level deprivation, and self-efficacy beliefs. Males, younger adolescents and adolescents with lower self-efficacy were more at risk of being problematic gamers.

Conclusion The current study expands the existing literature on the detrimental impact of inequalities on adolescent behaviours by highlighting the association between relative deprivation and problematic gaming. Policymakers are advised to implement measures to reduce inequalities and mitigate maladaptive gaming patterns among adolescents.

INTRODUCTION

Playing video games is a popular activity, with many European adolescents playing regularly.¹ Research shows that low to moderate levels of gaming can have positive effects on different life domains.² However, when looking at gaming through the lens of addictive behaviours, the results are markedly different. Although frequent gaming itself may not be problematic, the presence of addictive gaming symptoms can have negative consequences for adolescents' well-being and mental health.¹ Given the ongoing debate about definitions and diagnostic criteria for (internet) gaming disorder³ and consistently with previous research,⁴ the current study

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Problematic gaming (PG) can contribute to adolescents' adverse well-being.
- ⇒ Little is known about socioeconomic predictors of PG.

WHAT THIS STUDY ADDS

- ⇒ Using data from a representative sample of Italian adolescents, this study shows that adolescents who are relatively more deprived than their classmates are more likely to report PG when controlling for other economic, sociodemographic and psychological factors.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Future research needs to elucidate the mechanisms responsible for the linkage between relative deprivation and PG.
- ⇒ Future health programmes and policies that aim to reduce PG are advised to incorporate actions that address socioeconomic inequalities, as they play a critical role in the development of this behaviour.

refers to problematic gaming (PG). PG is defined as a risky pattern of gaming characterised by potentially dysfunctional addictive symptoms such as conflict and loss of control, which may have negative consequences in daily life.⁵

Given the relevance of the phenomenon, and the negative effects PG can have on physical and psychological well-being,⁶ it is critical to understand its possible determinants. Until now, research analysing the antecedents of PG focused on game-related factors and individual characteristics,⁷ such as rewarding elements within the game,⁸ social anxiety and low self-esteem, as videogames can provide means for escaping unwanted aspects of daily life and reality.⁹

However, research on the social determinants of PG is scant, especially in relation to socioeconomic factors.^{4,7} According to the digital inequality framework,¹⁰ the socioeconomic structure of society can impact the extent to which individuals use technological instruments like videogames. Specifically, adolescents living in disadvantaged contexts may lack the resources to develop adaptive gaming

habits, referring to the ability to engage in gaming in a healthy and balanced way⁴; for example, parents from less wealthy families may possess fewer resources to fulfil adolescents' needs or to establish and enforce clear rules regarding gaming.^{4,7} Moreover, the subjective perception of having a lower social position compared with peers can also be relevant to the development of maladaptive technology use patterns like PG,¹⁰ especially in adolescence, where social comparison and peer affiliation processes are fundamental.¹¹ Thus, relative deprivation (RD), that is, the individual's economic shortfall compared with classmates in the classroom context,¹² may be a critical determinant of PG. Hence, the current study aims to investigate the role of RD in predicting adolescents' PG in a representative sample of Italian adolescents.

Adolescents spend a large portion of their time in classrooms at school, where they have many opportunities to compare themselves with classmates on wealth-related aspects of their lives. Experiencing greater RD in the classroom may lead to stronger perception of social class differences, thus intensifying upward social comparison processes.^{13,14} Ultimately, this could result in negative self-evaluations, which can have important implications for adolescents' development, given their reliance on peer relationships for identity construction.¹¹ According to the behavioural system theory,¹⁵ contrasting effects can derive from the social evaluative threat created by perceived RD. Indeed, students may feel inadequacy and shame and activate compensation mechanisms. Videogames provide the opportunity to escape the negative thoughts deriving from (wealth-related) feelings of inferiority, by offering a distraction or an alternative reality where the adolescent can feel competent.¹⁶

Although research on the link between RD and gaming is scarce, some studies support this association in early adulthood. A study conducted in China revealed that RD positively predicted online gaming addiction, with maladaptive cognition partially mediating this relationship.¹⁷ Furthermore, a study conducted in the USA¹⁸ found a positive association between RD and PG, with financial gaming motives and emotional coping motives mediating this relationship. Moreover, recent evidence has identified specific school characteristics associated with PG. Zhai *et al*¹⁹ showed that negative perceptions of school environments are associated with more negative emotions, which can be regulated through online behaviours. These results are corroborated by different studies showing how more relatively deprived adolescents show decreased school engagement and consequentially, may use gaming as a compensation tool.^{7,20} Yet, despite these preliminary findings, important gaps remain in the literature. Specifically, studies have mostly employed convenience samples of college students and used subjective measures of RD, which can be more sensitive to biases and errors.²¹

Following these research findings, we hypothesised that RD in the classroom context would be associated with the risk of adolescent PG. Specifically, we hypothesised that adolescents who are more relatively deprived than their classmates have higher likelihoods of developing PG. Furthermore, given the influence of household socioeconomic status (SES) on the development of various problematic behaviours²² and to distinguish the effect of RD in classroom from overall classroom SES, we controlled for absolute deprivation (AD) at both the household and classroom level. Finally, based on previous literature showing that individuals with low self-confidence may struggle to use adaptive coping strategies and rely on gaming as a coping mechanism, thus potentially leading to PG,²³ we also controlled for the effects of perceived problem-solving self-efficacy.

METHODS

Full methodology details are provided in the online supplemental materials.

Data sources and procedure

Data were collected as part of the 2022 Health Behaviour in School-aged Children (HBSC) study. HBSC is a WHO Collaborative Cross-National Survey of adolescents' health and well-being. HBSC collects data every 4 years on health behaviours, social environments and sociodemographic characteristics in adolescents aged 11–15 years. The Italian HBSC survey additionally includes those aged 17 years.²⁴ This survey included 94 178 students (97.3% response rate at the individual level) aged 11, 13, 15 and 17 years.

Measures

Problematic gaming was only reported by adolescents who declared to play videogames. These participants completed the Internet Gaming Disorder Scale-Short Form (IGDS9-SF).²⁵ This measure consists of nine items ($\alpha=0.88$) evaluating to what extent participants endorse the nine criteria for IGD according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5).⁵ Participants rated their level of agreement with each item on a scale from 1 ('never') to 5 ('very often'). To discriminate between problematic and non-problematic gamers, we implemented the more stringent DSM-5 approach, and participants replying 'often' or 'very often' on at least five out of the nine items were classified as problematic gamers,^{5,6,26} resulting in a binary variable (0=non-problematic vs 1=problematic gamers).

All socioeconomic variables included in the study are derived from the 6-item HBSC Family Affluence Scale (FAS).²⁷ These items measure material assets in the home or family activities that represent affluence (eg, "Do you have your own bedroom for yourself?"). A summation of these scores provides a valid, reliable and age-appropriate measure of material affluence, which is less affected by non-response bias than longer assessments requesting data on household income or parental occupation.²¹

Relative deprivation was calculated by applying the formula first shown by Yitzhaki²⁸ and later modified by Subramanyam *et al*²⁹ to the FAS total score, with classmates as a reference group. Specifically, the formula estimates the average difference in FAS scores between the individual (i) and all N classmates reporting higher scores (j): $RD_i = 1/N \sum (y_j - y_i)$, $\forall y_j > y_i$. The Yitzhaki index was then bounded to a 0–1 scale by dividing it by the class average FAS score, with higher scores indicating greater RD compared with classmates.²¹

Absolute deprivation was calculated by transforming the FAS summary score into proportional ranks (ridits) that ranged from 0 (least wealth) to 1 (most wealth). The score was then reversed so that higher scores represent higher levels of AD.

Class absolute deprivation was calculated by aggregating the weighted AD scores in each classroom.

Gender was assessed by asking adolescents whether they were a boy or a girl. *Age* was computed based on the respondent's month and year of birth and the date of the survey assessment. *Family structure* was assessed with a single question asking adolescents with whom they usually live in their home (adolescents were classified as living with two parents/stepparents vs living with one parent or other arrangements). *Self-efficacy* was measured with two items ($r=0.43$), with responses on a Likert scale ranging from 1 ('never') to 5 ('always'). The items were summed, with higher scores indicating greater self-efficacy.³⁰

Table 1 Descriptive statistics of the final sample divided by gaming group

	Gaming group			p value	% of missing values
	Overall (n=58 881)	Non-problematic (n=53 003)	Problematic (n=2 506)		
Gender				<0.001	0
Boys	37 992 (64.5%)	33 921 (64.0%)	1 847 (73.7%)		
Girls	20 889 (35.5%)	19 082 (36.0%)	659 (26.3%)		
Grade				<0.001	0
I Middle school	17 881 (30.4%)	15 542 (29.3%)	1 010 (40.3%)		
III Middle school	16 352 (27.8%)	14 628 (27.6%)	804 (32.1%)		
II High school	13 902 (23.6%)	12 714 (24.0%)	466 (18.6%)		
IV High school	10 746 (18.3%)	10 119 (19.1%)	226 (9.0%)		
Family affluence				<0.001	4.4
Low (bottom 20%)	14 267 (25.4%)	12 721 (24.8%)	722 (30.6%)		
Medium (middle 60%)	30 002 (53.3%)	27 679 (54.0%)	1 096 (46.4%)		
High (top 20%)	11 982 (21.3%)	10 893 (21.2%)	542 (23.0%)		
Family structure				<0.001	0
Two parents	47 794 (81.2%)	43 670 (82.4%)	1 853 (73.9%)		
Fewer than two parents	11 087 (18.8%)	9 333 (17.6%)	653 (26.1%)		
Relative deprivation	0.123 (0.13)	0.122 (0.13)	0.139 (0.16)	<0.001	<0.001
Absolute deprivation	0.395 (0.16)	0.394 (0.16)	0.408 (0.19)	<0.001	4.4
Class absolute deprivation	0.397 (0.07)	0.397 (0.07)	0.405 (0.07)	<0.001	<0.001
Self-efficacy	7.160 (1.55)	7.194 (1.52)	6.443 (1.98)	<0.001	0.2

Problematic gaming has 3 372 (5.7%) missing values. Adolescents with missing values are still reported in the overall column. The p value statistics are acquired from a χ^2 test for categorical variables and a t-test for continuous variables. Adolescents with missing values were excluded from the analysis.

Data cleaning and analysis

The original dataset comprised data from 89 321 adolescents (49.4% girls, mean age = 13.95 ± 2.20), divided into 5669 classes. We removed 30 440 (34.1%) participants who reported never playing games and consequently did not answer the IGDS9-SF. Descriptive statistics of these participants are available in online supplemental table 1. The percentage of missing data in the final sample ranged from 0% (regarding age and gender) to 5.7% (PG).

All analyses were performed using STATA V.19. Descriptive statistics were weighted and incorporated SEs adjusted for class-level clustering in the data. We used a two-level multiple logistic regression model with adolescents nested in classes to investigate the association between RD and PG, while accounting for the fixed effects of gender, age, family structure, absolute and classroom deprivation, self-efficacy and random effects of class variation.

RESULTS

Table 1 summarises the individual-level characteristics of the entire sample and stratifies participants based on whether adolescents' gaming was classified as problematic or not. Overall, our final sample was mainly composed of boys (64.5%) of younger ages and middle-class families. The prevalence of PG in the final sample was 4.5%, while it was 5.2% for boys and 3.3% for girls. Significant differences between non-problematic and problematic gamers were observed in the proportions and means of all individual-level variables. Boys, younger adolescents, adolescents from less affluent families and adolescents not living with both of their parents were over-represented in the group of problematic gamers.

Results from our regression model (**table 2**) indicate that adolescents who were more deprived compared with their classmates showed higher likelihoods of being problematic gamers (OR 8.05, 95% CI 3.12 to 20.79), after controlling for absolute and class deprivation (which were negatively and positively

associated with adolescent PG, respectively). It should be noted that this OR represents the full theoretical range (0–1) in RD so that the most relatively deprived adolescents are eight times more likely to be classified as problematic gamers compared with adolescents reporting no RD. Levels of RD in our sample were relatively low (**table 1**); as such, the OR might be exaggerating the effect. Furthermore, we ran a Poisson regression model using PG symptoms as the continuous dependent variable to control whether this association was affected by the five-symptoms cut-point. Results are coherent with the main analysis and are available in online supplemental table 2.

Table 2 Multilevel logistic regression with being classified as a problematic gamer as the outcome (n=52 857)

	OR	95% CI
Gender		
Girls	1.00	
Boys	1.93***	1.64 to 2.28
Grade level		
I Middle school	1.00	
III Middle school	0.73**	0.59 to 0.91
II High school	0.50***	0.41 to 0.61
IV High school	0.27***	0.21 to 0.35
Family structure		
Fewer than two parents	1.00	
Two parents	0.67***	0.57 to 0.80
Absolute deprivation	0.17***	0.07 to 0.43
Relative deprivation	8.05***	3.12 to 20.79
Class absolute deprivation	16.70***	4.28 to 65.18
Self-efficacy	0.75***	0.72 to 0.79
Random part		
Class variance	1.34	1.17 to 1.51

p<0.01, *p<0.001.

Regarding the sociodemographic and psychological factors, males were almost twice as likely to be categorised as problematic gamers, while older adolescents and those living with two parents showed a lower likelihood of PG. Furthermore, adolescents reporting higher levels of self-efficacy were also less likely to engage in PG.

DISCUSSION

The present study investigated the associations between RD in the classroom context and adolescent PG in a representative sample of Italian adolescents. Results supported our hypothesis: adolescents who are relatively more deprived than their classmates are more likely to report PG, also after controlling for different economic and sociodemographic factors and self-efficacy beliefs. These findings underscore the importance of socioeconomic inequalities as a risk factor for PG among adolescents.

Several mechanisms can help explain this association. Greater RD in classroom may contribute to greater perception of social status differences, thus provoking adverse negative upward social comparison processes,^{13 14} ultimately resulting in negative self-evaluations. This can lead to risky behaviours to alleviate these undesirable feelings, with video games representing accessible and immediate tools to cope with negative emotions.¹⁶ In accordance with numerous studies that highlighted the key role that escape and coping motivations play in the development of PG,^{16 31} it is plausible that PG may emerge as a maladaptive coping behaviour to RD. Furthermore, gaming may allow relatively deprived adolescents to construct an alternative online self, which could potentially reinforce escapism and contribute to the development of PG. Consistently, a recent review³² showed that gamers who exhibit higher avatar identification to compensate for perceived physical world inadequacies are more likely to report PG. The perceived opportunities provided by gaming to feel competent and ‘better than others’² in something may further reinforce negative gaming pattern, thus increasing the risk of PG.³³ The present explanation is also in line with the Interaction of Person-Affect-Cognition-Execution model.^{34 35} Feelings of RD may serve as an internal trigger provoking specific affective and cognitive responses in the adolescent, such as playing videogames for mood regulation and coping. This research for gratification may alter the adolescents’ beliefs and reward expectations associated with gaming, making it harder to control their gaming activity and thus evolving in PG over time.³⁴

Finally, RD could contribute to increased PG due to the ‘gamblification’ of digital games.³⁶ Although the present study did not examine which games adolescents play, young people tend to prefer battle royale games,³⁷ which often include loot boxes and battle passes. These elements, which involve unpredictable reward systems and encourage players to repeatedly purchase in-game items, resemble gambling systems and can increase the risk of PG.³⁸ Thus, given the already established link between RD and disordered gambling,¹³ it is plausible that RD may increase motivations to play in ‘gamblified environments’ as a means to earn money and status, which has been associated with the development of PG.³⁹ However, in the present study, we could not ascertain whether the association between RD and PG is explained by these mechanisms. Therefore, further longitudinal or experimental studies are needed to test their potential contribution. In addition, future studies that aim to better elucidate the association between RD and PG could use mixed-method approaches that capture adolescents’ experiences of inequality, which lead them towards PG. Understanding

how teenagers perceive RD qualitatively and the strategies they employ to cope with it could advance both theory and practice.

The inclusion of different contextual variables offers valuable insight into the diverse effects these can potentially have on PG. Notably, adolescents’ AD, as assessed by their family affluence, was negatively associated with PG, whereas higher classroom deprivation was associated with a higher likelihood of PG. These findings align with prior research examining the associations between RD and problematic social media use.¹⁴ Adolescents from lower socioeconomic family backgrounds may have fewer opportunities to access gaming equipment or high-speed internet. Additionally, their immediate concerns, like meeting basic needs or supporting their families, may reduce the amount of time or interest they can dedicate to gaming. In contrast, classrooms with more economically deprived adolescents may have limited access to cultural resources and a worse classroom climate, thus being less equipped to prevent or address students’ problematic behaviours.⁴⁰ In turn, the absence of a positive classroom climate may reduce opportunities for reciprocal support among classmates, potentially exacerbating the social comparison processes linked to RD.¹³ Finally, being male, younger and living in a single parent household were all possible risk factors towards PG. These results are in line with previous research using representative samples of US and European adolescents.^{4 6 41} It could be that gaming is a prevalently male-dominated culture,⁴² and that younger adolescents are more vulnerable to PG because they are still in the midst of neural developmental processes crucial for impulsivity and self-control.^{43 44} Finally, according to the family stress model,⁴⁵ parents in single-parent households may perceive higher distress due to the increased amount of responsibilities they must handle. This stress could interfere with effective parenting practices, thereby influencing adolescents’ adjustments. To illustrate, single parents may permit their children to spend extended time gaming to manage other family tasks or to have some time for themselves.⁴⁶

This study has some limitations that should be noted in interpreting these results. First, its cross-sectional design limits the possibility of drawing causal conclusions about the association between RD and PG. Another limitation is the use of self-reported data on PG symptomatology that is often vulnerable to biased responding. Future studies should try to replicate these findings by incorporating reports by different informants to provide more robust results. Third, results are representative of the Italian adolescents’ population, but they still need to be replicated in nations with a different cultural background. In fact, the association between RD and PG may differ in countries with different cultural norms regarding the acceptance of status differences and stronger social hierarchy.⁷ Fourth, RD was calculated by applying the Yitzhaki index to a single reference group (ie, the adolescents’ classmates), whereas individuals can compare their social class with others based on similarity of sex, age group and sometimes place of residence.⁴⁷ Although we partially account for this issue, as classmates are among the main sources of comparison for adolescents in Italy,⁴⁸ future research could extend Yitzhaki’s formula to include stratifications based on different reference groups. Finally, the underlying mechanisms linking RD to PG were inferred despite gaps in our data, as the HBSC survey did not include any information on which games adolescents play and whether they undertake social comparison processes with their classmates. Furthermore, our results do not take into consideration other factors that may moderate or confound the association between RD and PG such as materialistic values, self-esteem, individual psychopathological features and interpersonal problems (eg, peer problems,

bullying, family conflicts). Materialistic values—shown to be fostered by personal RD even when controlling for SES⁴⁹—may in turn increase susceptibility to PG by emphasising extrinsic rewards, competition and status-seeking within gaming environments. Self-esteem may also function as a vulnerability or buffering factor: lower self-esteem has been consistently associated with higher levels of PG⁹ and may intensify the tendency to use gaming as an escapist coping route after experiencing RD. Furthermore, adolescents exhibiting internalising symptoms could be more vulnerable to downward spiral associations in which gaming as a compensatory mechanism could exacerbate their psychopathology.⁵⁰ Finally, interpersonal problems could worsen the feelings of social comparison and isolation associated with RD, further increasing the compensatory function of PG.¹⁶ By including these constructs, future studies can better understand how adolescents' perceptions of being relatively deprived compared with classmates feed into their self-concept and risk of PG.

Despite these limitations, this is the first study to investigate the association between RD and PG in a representative sample of adolescents. Our findings contribute to a better comprehension of the socioeconomic determinants associated with PG, while confirming links identified in previous research. Particularly, by refining our focus towards classroom-level inequalities, we were able to set our study in the social context in which peer processes typical of microsystems happen.⁵¹ As such, our work complements recent representative research that focused on macro-processes such as country-level inequalities and their associations with PG.⁴

Furthermore, using multiple socioeconomic variables offers deeper insights into the socioeconomic patterns of PG than relying on a single socioeconomic index. Specifically, employing the Yitzhaki index to measure RD provides a window into the impact that classroom inequalities have on adolescents, further beyond what would have been possible with a single measure of wealth.²¹ Overall, findings underline the potential detrimental influences of growing up in unequal settings on adolescents' PG.

The current study highlights the critical role that economic inequalities play in the development of PG. Policymakers and practitioners aiming to reduce maladaptive gaming patterns among adolescents should therefore adopt integrative approaches that address the social determinants of PG. In this context, schools offer an ideal environment to promote safe and prosocial *online*⁵² behaviours. For example, group discussions and interventions targeting both objective and perceived social class differences between classmates could have widespread positive effects on well-being, extending beyond PG. Taken together, these findings underscore the need for future research and intervention strategies that consider the broader socioeconomic context in which adolescent gaming behaviours develop.

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Data availability statement Data may be obtained from a third party and are not publicly available. The 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, Dr Paola Nardone: paola.nardone@iss.it.

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