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RESEARCH ARTICLE

Factors associated with playing video games to forget or alleviate real life problems in adolescence

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ABSTRACT

Problematic video game playing (PVGP) in adolescents is associated with an array of mental and behavioral problems. Identifying the function of video game playing that are associated with poorer outcomes may provide a better understand of the problem so that adolescents can be helped to foster a healthier relationship with their devices. The aim of the present study is to assess whether sociodemographic factors, drug use, bullying victimization and perpetration, and mental health symptoms are associated with playing video games with the intent to alleviate problems among Brazilian eighth grade students. A cross-sectional survey nested in a cluster randomized controlled trial was used. The participants included 3939 eighth grade students who answered a self-report questionnaire anonymously. Weighted logistic regressions were used to investigate the associated factors. The results showed that 57% (CI = 55.85; 58.15) of these adolescents reported playing with an escapism function. Playing to forget or alleviate real life problems is associated with being male, using tobacco, bullying victimization and perpetration, healthy levels of prosocial behavior, and emotional symptoms; the strongest association was with emotional symptoms (OR = 1.98; 95% CI 1.73; 2.28). Playing video games as a form of escapism has been shown to be a relevant aspect for investigation among this population, as it is related to mental health symptomatology in adolescence. An understanding of these data through an experiential avoidance, within an acceptance and commitment perspective is suggested, since it may help broadening the understanding of the problems related to video game playing, its comorbidities and may have direct treatment implications.

Keywords: adolescents; video games; experiential avoidance; epidemiology

1. Introduction

Problematic video game playing (PVGP) may be understood as playing that leads to impairment in different dimensions of life[1]. PVGP in adolescents has been found to be associated with an array of mental and behavioral problems such as anxiety, depression, hyperactivity, and inattention[2]. So far, little effort has been made to understand the comorbidities related to this condition in the adolescent population[3] and there are few interventions available to successfully treat it[4]. It is relevant to investigate adolescents gaming characteristics separately since teenagers are more vulnerable to video games negative effects, due to the sensitive developmental stage they are at.

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In order to better understand PVGP, different aspects of playing are being investigated, such as psychological factors (e.g., impulsivity and anxiety), characteristics of game playing (e.g., money spent on gaming and game time)[5,6] and functional aspects, especially motivation for playing and how it relates to problematic playing[7]. From the different approaches to understanding this phenomenon, looking at why players do it seems to be a more effective way of investigation[8], as it allows to deepen the functional understanding of the problem.

Some of the motivations to play video games are achievement, socializing, immersion, relaxation, and escapism[9]. Escapism-the use of online environment as a way to forget and avoid thinking of real life problems has been found to be one of the motivations associated with problematic playing[7,10].

When trying to understand the motivation for playing, specially escapism and problems related to it, researchers usually used a mixed age sample, through online recruiting in high-income countries[9,11]. Since the playing of video games is highly prevalent among adolescents[2], understanding the association between playing and avoiding problems in non-clinical and representative population samples is relevant, since adolescence is an important developmental stage, with specific biopsychosocial functioning[12]. Looking at adolescents from low- and middle-income countries (LMICs) is especially necessary, as this population is at a greater risk for mental health problems and related conditions[13]. Investigating functions related to playing video games may also help in the understanding of normal comorbidities regarding PVGP in this population and in the suggestion of treatment directions that target not one problem at a time, but all problems that share common functions[14].

The aim of the present study is to assess whether sociodemographic factors, drug use, bullying victimization and perpetration, and mental health symptoms are associated with playing video games to forget or alleviate problems among Brazilian eighth grade students.

2. Methods

2.1. Study design

This study was a cross-sectional survey nested in a cluster randomized controlled trial (RCT) which evaluated a school drug prevention program based on the European Unplugged program[15], which has already been culturally adapted for use in Brazil[16,17] with its second version, #Tamojunto2.0, being evaluated in Brazilian public schools[18].

The present study analyzed the baseline data collected prior to the application of the intervention. No effects of the program was investigated in the present manuscript. It was registered in the Brazilian Ministry of Health's Brazilian Registry of Clinical Trials (Registro Brasileiro de Ensaios Clínicos-REBEC) under the number RBR-8cnkwq. Study protocol was approved by the Federal University of São Paulo's research ethics committee (protocol 2.806.30).

2.2. Sampling

The study sample consisted of eighth grade students (average age = 13.20 ± 0.84) from public schools in the cities of São Paulo (the largest Brazilian city), Fortaleza (an important northeast Brazilian city), and Eusebio (part of Fortaleza's metropolitan region). PASS 15.0 software was used to calculate sample sizes of the two groups in a cluster RCT[13]. The sample size was estimated to reach a power of 82% in identifying a difference between groups of 2.5%, with an initial prevalence of 10%, a significance level of 5% and an intraclass correlation of 0.005. More information about the randomization process are in the studies of Sanchez et al.[19,20].

According to Sanchez et al.[18], 5371 students were present during the baseline data collection. Of the total number of students who participated in the RCT, only 3939 were included in the present study, as 1432 of the total sample did not answer the question in the questionnaire that evaluated the variables investigated herein.

Consent to participate in the study was obtained from the schools' directors before randomization, and from students and parents, after randomization.

2.3. Instruments and variables

Further details regarding the study instrument are presented by Galvão et al.[21], that show the questionnaire validation.

The data were collected through a questionnaire completed anonymously by the participants and administered by researchers in the classroom, without the presence of the teacher. Part of the questionnaire was developed and tested by the European Union Drug Abuse Prevention (EU-DAP) program and has been used in previous studies on the effectiveness of the Unplugged program[22]. A version that had been translated into and adapted for use by Portuguese language speakers was used in Brazil[23], with some questions replaced by items from two questionnaires that have been widely used in various studies of Brazilian students—A World Health Organization questionnaire, used in the VI Brazilian Survey of Drug Use among students[24], and the questionnaire of the National Survey of Student Health (Pesquisa Nacional de Saúde do Escolar-PENSE), used by the Brazilian Ministry of Health[25]. In addition, questions on eating disorder symptoms[26], bullying[27], mental health symptoms[28], and video game use[29] were added. Further details regarding the study instrument are presented by Galvão et al.[21], that also show the questionnaire validation.

In the present study, the outcome variable assessed was the use, in the past year, of video games to forget problems. This data were gathered through a dichotomic (yes or no) question: "Have you played to forget or alleviate real life problems?" that was the eighth of a nine-item dichotomous scale, based on the DSM-5[29], used to assess PVGP in that population[30].

The explanatory variables analyzed were:

1) Adolescent drug use: the use (yes or no) of alcohol and tobacco over the past year was assessed with questions, such as "in the past year", i.e., in the last 12 months, did you drink alcoholic beverages?

2) Bullying victimization and perpetration: these variables were measured using two dimensions of bullying victimization (ranging from 0 to 7, where a higher score represents greater bullying victimization) and perpetration (ranging from 0 to 8, where a higher score represents greater bullying perpetration). Data relating to bullying victimization and perpetration were collected through the Olweus Bully/Victim Questionnaire[27]. This instrument consists of a two-dimensional scale that investigates episodes of bullying in school—one to assess bullying victimization with seven dichotomous questions (yes or no). The other scale, to assess bullying perpetration, consists of eight dichotomous questions (yes or no). In this questionnaire, students indicated if they had experienced repeatedly, in the last 30 days, specific types of bullying, including verbal, physical, and relational bullying[27]. With regards to the reliability and validity of the bullying perpetration and victimization scales, previous studies from different countries have reported good internal consistency, with a Cronbach's alpha ranging from 0.80 to 0.90[31].

3) Sociodemographic data i.e., gender, age and socioeconomic status. The students' socioeconomic status was assessed using the scale of the Brazilian Association of Research Companies[32], which takes into account the head of the household's education, and goods and services used, with scores ranging from 0 to 100 being arranged into five categories—from A to E; higher scores in this scale indicate better economic standing, with socioeconomic classes being ranked from A (highest) to E (lowest).

4) Mental health status, which was calculated using the strengths and difficulties questionnaire (SDQ)[28,33]. This scale evaluates children's and adolescents' mental health by asking them to answer 25 questions about events occurring in the last six months. The 25 items are divided into five scales of five items each, generating scores for conduct problems, inattention/hyperactivity, emotional symptoms, peer problems, and prosocial behaviors. Its psychometric properties are adequate for the Brazilian population[28]. Results are classified as normal, borderline, or abnormal in each of the scales. In this research, borderline respondents were classified as normal.

2.4. Statistical analysis

Analyses were performed using weighted data to correct the unequal probabilities of the sample selection. Sample weights considered each participant's school as the primary sampling unit, with stratification by city, the total number of students expected in each class, those present on the day of the survey, and the total amount expected in each city according to the national registry (Instituto Nacional de Estudos e Pesquisa Educacionais Anisio Teixeira [INEP]). We considered each school as a cluster.

Stata 16 software was used, with SVY commands, for descriptive statistics on the weighted percentages (wgt%). To determine the relationship between the outcome and explanatory variables (alcohol and tobacco use, bullying victimization and perpetration, ABEP score, gender, age, and psychological attributes) that are all categorical variables-Pearson's chi-square test was used.

The same program was used to run univariate and multivariate logistic regressions[34] with exploratory variables affecting the outcome measure. An initial univariate logistic regression, including the explanatory variables with a p-value ≤ 0.20, was considered. A backward procedure was used to remove the explanatory variables with $p > 0.05$, aiming to obtain a final model for each response variable. Inferential point estimates were given in odds ratio (OR) with their respective 95% confidence intervals (CIs) and p-values. The level of significance was set at 5%.

3. Results

3.1. Descriptive analysis

Table 1 shows the sociodemographic characteristics of the students who answered the question regarding whether they played video games to forget about problems (n = 3.658). There was a balance between male (48.74%) and female (51.26%) participants, and most of them were between the ages of 12 and 14 (92.39%) and belonged to the middle socioeconomic class (53.95%). Alcohol was consumed in the previous year by 35.51% of them; 44.85% were victims of bullying; and when it came to psychological difficulties, 20.45% struggled with conduct problems. The majority of the students reported having played video games to forget problems (57.00%).

Table 1. Distribution of sample according to sociodemographic variables, drug use, bullying, clinical level mental health problems (SDQ) and playing video games to forget about problems (N = 3.658).

	N	**wgt%**	**wgt95% CI**
Sex			
Boys	1783	48.74	[47.41; 50.07]
Girls	1875	51.26	[49.93; 52.59]
Age (years)			
12–14	3379	92.39	[91.36; 93.30]
15–17	279	7.61	[6.70; 8.64]

Table 1. (*Continued*).

	N	wgt%	wgt95% CI
Mean age	13.20 ± 0.84		-
ABEP score[a]			
	24.98 ± 9.35		
A (45–100)	158	4.33	[3.72; 5.03]
B (29–44)	998	27.28	[24.94; 29.75]
C (17–28)	1973	53.95	[52.27; 55.62]
D/E (1–16)	529	14.44	[12.79; 16.26]
Adolescent past-year drug use			
Alcohol	1299	35.51	[34.17; 36.88]
Tobacco	231	6.32	[5.70; 7.01]
Bullying[b]			
Victim	1640	44.85	[43.34; 46.36]
Practitioner	1032	28.20	[26.89; 29.55]
Psychological attributes[c]			
Hyperactivity inattention	630	17.21	[16.08; 18.40]
Absent prosocial behavior	484	13.22	[12.48; 14.00]
Conduct problems	748	20.45	[19.34; 21.61]
Peer relationship problems	470	12.86	[12.03; 13.74]
Emotional symptoms	711	19.45	[18.55; 20.39]
Play video games to forget problems	2085	57.00	[55.85; 58.15]

a: socioeconomic classification according to ABEP; b: Olweus Bully/Victim Questionnaire; c: strengths and difficulties questionnaire (SDQ).

Table 2 shows the distribution, with its percentage and standard error, of sociodemographic variables (sex, age, and socioeconomic status (SES)), drug use, bullying, and abnormal level mental health according to the status of students in relation to reporting playing video games to forget problems. The data shows that, excluding age, all relations found were statistically significant ($p < 0.05$). Playing to forget about problems was more prevalent among males (61.81% vs. 52.29%), tobacco users (70.7% vs. 56.16%), alcohol users (60.96% vs. 54.82%), bullying perpetrators (65.92% vs. 53.78%), those who were victimized (65.70% vs. 50.27%), adolescents with healthy levels of prosocial behavior (58.57% vs. 47.47%, and those who presented emotional symptoms (70.81% vs. 53.83%).

Table 2. Distribution of adolescents that play video games to forget about problems according to sociodemographic variables, drug use, bullying, and abnormal level mental health problems (SDQ).

	Play video games to forget problems (*N* = 3658)						
	No (*N* = 1573)			**Yes (*N* = 2085)**			
	N	**%**	**95% CI**	***N***	**%**	**95% CI**	***p*-value**
Sex							
Boys	664	38.19	[36.3; 40.11]	1089	61.81	[59.89; 63.7]	<0.001
Girls	869	47.71	[46.19; 49.23]	996	52.29	[50.77; 53.81]	
Age							
12 to 14	1393	43.04	[41.96; 44.13]	1899	56.96	[55.87; 58.04]	0.789
15 to 17	123	43.55	[39.55; 47.64]	162	56.45	[52.36; 60.45]	

Table 2. (*Continued*).

	Play video games to forget problems (*N* = 3658)						
	No (*N* = 1573)			**Yes (*N* = 2085)**			
	N	**%**	**95% CI**	***N***	**%**	**95% CI**	***p*-value**
SES							
A	51	36.61	[30.89; 42.73]	90	63.39	[57.27; 69.11]	0.002
B	365	40.31	[37.86; 42.80]	549	59.69	[57.20; 62.14]	
C	859	44.77	[43.11; 46.45]	1107	55.23	[53.55; 56.89]	
D/E	262	43.91	[41.96; 45.87]	342	56.09	[54.13; 58.04]	
Tobacco use							
No	1463	43.84	[42.71; 44.98]	1922	56.16	[55.02; 57.29]	<0.001
Yes	70	29.30	[25.16; 33.81]	169	70.70	[66.19; 74.84]	
Alcohol use							
No	1077	45.18	[43.92; 46.44]	1315	54.82	[53.56; 33.81]	<0.001
Yes	461	39.04	[37.12; 40.99]	779	60.96	[59.01; 62.88]	
Bullying perpetration							
No	1186	46.22	[44.94; 47.50]	1410	53.78	[52.50; 55.06]	<0.001
Yes	330	34.08	[32.19; 36.01]	666	65.92	[63.99; 67.81]	
Bullying victimization							
No	989	49.73	[48.23; 51.23]	1020	50.27	[48.77; 51.77]	<0.001
Yes	533	34.30	[32.98; 35.64]	1066	65.70	[64.36; 67.02]	
Hyperactivity/Inattention							
Absent	1299	44.74	[43.42; 46.07]	1644	55.26	[53.93; 56.58]	<0.001
Present	202	33.95	[31.34; 36.66]	408	66.05	[63.34; 68.66]	
Prosocial behavior							
Normal	1231	41.43	[40.22; 42.66]	1795	58.57	[57,34; 59.78]	<0.001
Problematic	243	52.53	[49.64; 55.40]	224	47.47	[44.60; 50.36]	
Conduct problems							
Absent	1241	44.39	[43.05; 45.74]	1592	55.61	[54.26; 56.95]	<0.001
Present	262	36.95	[34.63; 39.34]	464	63.05	[60.66; 65.37]	
Peer relationship problems							
Absent	1326	43.90	[42.55; 45.25]	1759	56.10	[54.75; 57.45]	<0.001
Present	172	35.60	[31.94; 39.45]	293	64.40	[60.55; 68.06]	
Emotional symptoms							
Absent	1295	46.17	[44.78; 47.56]	1540	53.83	[52.44; 55.22]	<0.001
Present	206	29.19	[26.90; 31.59]	514	70.81	[68.41; 73.10]	

SE = Standard error.

3.2. Logistic regression

Table 3 presents the results of the univariate and multivariate logistic regressions for playing video games to forget about problems. Playing with this purpose was associated with being male (aOR = 1.96), tobacco use (aOR = 1.59), bullying perpetration (aOR = 1.35) and victimization (aOR = 1.63), prosocial behavior (aOR = 1.75) and presenting emotional symptoms (aOR = 1.98). Presenting emotional symptoms was the variable with the strongest association with playing to forget problems; these adolescents were 108% more likely to play to forget problems in the univariate analysis, and 98% in the multivariate analysis.

Table 3. Logistic regression estimates for playing video games to forget about problems during the year prior to the according to sociodemographic variables, drug use, bullying, and abnormal level mental health problems (SDQ) (crude and adjusted odds ratios).

	Play video games to forget problems (*N* = 3658)					
	Univariate regression			**Multivariate regression**		
	cOR	**95% IC**	***p*-value**	**aOR**	**95% IC**	***p*-value**
Boys (ref. Girls)	1.48	[1.33; 1.64]	<0.001	1.96	[1.75; 2.20]	<0.001
Age	0.98	[0.84; 1.14]	0.789	-	-	-
SES (ref. D/E)						
C	0.97	[0.87; 1.07]	0.497	-	-	-
B	1.16	[1.01; 1.34]	0.037	-	-	-
A	1.35	[1.02; 1.80]	0.037	-	-	-
Tobacco use (ref. No)	1.88	[1.54; 2.31]	<0.001	1.59	[1.27; 1.98]	<0.001
Alcohol use (ref. No)	1.29	[1.18; 1.41]	<0.001	-	-	-
Bullying perpetration (ref. No)	1.66	[1.51; 1.83]	<0.001	1.35	[1.19; 1.54]	<0.001
Bullying victimization (ref. No)	1.89	[1.75; 2.05]	<0.001	1.63	[1.44; 1.83]	<0.001
Hyperactivity/Inattention (ref. No)	1.58	[1.38; 1.80]	<0.001	1.31	[1.33; 1.52]	<0.001
Prossocial behavior (ref. Yes)	1.58	[1.30; 1.92]	<0.001	1.75	[1.54; 1.98]	<0.001
Conduct problems (ref. No)	1.36	[1.22; 1.53]	<0.001	-	-	-
Peer relationship problems (ref. No)	1.42	[1.18; 1.70]	<0.001	-	-	-
Emotional symptoms (ref. No)	2.08	[1.83; 2.37]	<0.001	1.98	[1.73; 2.28]	<0.001

4. Discussion

This study used the baseline data of a randomized controlled trial from a representative sample of eighth grade students in three cities in Brazil to investigate whether playing video games to forget or alleviate real life problems was related to socioeconomic aspects and behavioral and mental health problems such as tobacco and alcohol use, bullying perpetration and victimization, hyperactivity/inattention, lack of prosocial behavior, conduct problems, peer relationship problems, and emotional symptoms. Literature on escapism and problems related to video game playing usually use mixed-age and non-representative samples with online recruitment[7,9]. This study is important as it was conducted on adolescents, from an LMIC country, who were recruited at school (lowering sample bias), and because it intends to understand the phenomenon through a functional perspective, broadening the understanding of the phenomenon. It was found that playing to forget or alleviate problems is a frequent behavior among adolescents and is related to being male, using tobacco, bullying victimization and perpetration, prosocial behavior, and emotional symptoms. Therefore, playing as a form of escapism is shown to be a relevant aspect to be investigated among this population, as it is related to impaired conditions in adolescence.

Escapism, used in the field of research on video game playing, is highly compatible with the concept of experiential avoidance (EA), used in Acceptance and Commitment Therapy (ACT)[35]. EA is a functional dimensional way of understanding mental health problems[36], and is also considered a transdiagnostic mechanism[37]. It may be defined as "the phenomenon that occurs when a person is unwilling to remain in contact with particular private experiences (…) and takes steps to alter the form or frequency of these events and the contexts that occasion them (p. 1155)"[36]. The private experiences avoided may include body sensations, emotions, thoughts, and memories[36]. It is a coping strategy that may work as a way to diminish unpleasant experiences in the short term, but may lead to enhancing problems in the long term[38]. Engaging in EA may lead to negative psychological symptoms as it decreases one's ability to effectively cope with emotional experiences[39]. EA, in general, has been studied within the field of Contextual Behavioral Science (CBS)[40] as a way to understand complex psychological phenomena, with clear treatment implications. EA is shown to be associated with many mental health problems common in adolescents, such as anxiety[41],

technological addiction[42], self-injury[43], depression[44], bullying and victimization[45], and internalizing and externalizing problems[45], among other issues.

In this study, being male was found to be associated with playing for the purpose of escaping in this adolescent sample. Similar data was also found in studies using a mixed-age sample[9]. The present study found that tobacco use and both bullying perpetration and victimization were more prevalent among those adolescents who played to forget or alleviate real life problems. These results are compatible with previous studies that showed an association between these behavior problems and EA[45,46] as investigated through an ACT framework[35,36]. This reinforces the importance of trying to understand PVGP and looking to functionally understand it, instead of only categorizing it by its topographical dimensions, which is most commonly done and has not been shown to improve mental health assistance[36].

At first, it may seem contradictory that playing to forget about problems is associated with adequate prosocial behavior. However, looking through a motivation-to-play lens may help clarify how these two features are associated. Socialization is a common motivation for video game playing, and is also associated with PVGP[4,7,9]. Popular video game types include online playing where adolescents can interact with other players, supplementing or substituting face-to-face social interactions[47]. Social ties formed through online gaming can continue beyond the game and extend to offline activities[48]. It can be hypothesized that adolescents with healthy prosocial skills can better socialize while playing, therefore finding more opportunities to forget about problems while playing. Besides understanding this association through a motivation-to-play framework, it is also possible to analyze how prosocial behavior and PVGP relate by hypothesizing about the environment where the adolescents live. If the offline environment somehow deprives them of the opportunity to engage in social experiences, which are developmentally important in adolescence[12], they may look to the online setting to meet with friends and socialize. Attention should be drawn to the possible effects of substituting offline social gatherings with online ones, as some social skills (such as interpreting other people's facial expressions) cannot be practiced during online playing and, therefore, these skills may deteriorate if online and offline activities are not balanced.

The results of this study on the relationship between playing to forget about problems and emotional problems among adolescents are consistent with what has been previously described in literature, when understanding playing to forget about problems as a form of EA[38,41,44,45]. The use of video games as a means to avoid unpleasant experiences is related to lower levels of emotional regulation, a characteristic also associated with problematic gaming[11].

There are some limitations to this study. This study is a cross-sectional survey nested in an RCT; therefore, causality inferring is not possible. Regarding method, one of the limitations of this study are the 26.6% of missing data for the dependent variable, since the section for videogame use was at the end of the questionnaire and some students were not able to finish the same. Also, this study did not investigate EA, assessing only if the adolescent was playing to forget or alleviate real life problems. Since the relation studying PVGP through an ACT perspective seems to be fruitful as it may help broaden the understanding of the PVGP phenomenon and the outcomes related to it, future studies should use EA measures to assess the relation between PVGP and EA. Further, the sample consisted of only public-school students; private-school students and adolescents that were absent from school were not considered. The findings of this study cannot be compared to other studies as other studies used different methods of data collection.

Future studies, using different methodological designs, should explore other functions of the problems herein described and also the function of other PVGP comorbidities, in order to further the understanding of this phenomenon. Also, future studies should explore other functions of video game playing related to

emotional suffering in adolescents and use validated instruments to assess EA.

Nevertheless, the present results complement existing research by assessing whether motivation to play in an adolescent sample from schools is associated with behavioral and mental health problems. Also, it tries to expand the comprehension of the field by framing data with an ACT perspective. As ACT is an evidence-based, integrative, and transdiagnostic therapy model, that has been shown to be effective with other mental health conditions among adolescents[49], it may help expand the study of the field[8] and have direct treatment implications.

Author contributions

Conceptualization, LCB and MHSM; methodology, ZMS; formal analysis, LCB and ZMS; writing—original draft preparation, LCB; writing—review and editing, ZMS and MHSM; project administration, ZMS; funding acquisition, ZMS. All authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare no conflict of interest.

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