Computers in Human Behavior 149 (2023) 107932

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

"Belonging without being": Relationships between problematic gaming, internet use, and social group attachment in adolescence

Célia Barreto Carvalho [a,b,*], Joana Moura Cabral [a,b], Marco Teixeira [c], Filipa Cordeiro [d], Rodrigo Costa [d], Ana Moura Arroz [a,e]

[a] Faculty of Social and Human Sciences, University of the Azores, Portugal
[b] Cognitive and Behavioural Centre for Research and Intervention, Faculty of Psychology and Education Sciences, University of Coimbra, Portugal
[c] Family Therapy and Systemic Intervention Center, Portugal
[d] Gaspar Frutuoso Foundation, University of the Azores, Portugal
[e] Centre for Ecology, Evolution and Environmental Changes, Azorean Biodiversity Group (cE3c/ABG), CHANGE – Global Change and Sustainability Institute, University of the Azores, Portugal

ARTICLE INFO

Handling Editor: Min Jou

Keywords:
Adolescence
Social group attachment
Problematic gaming
Problematic internet use

ABSTRACT

Gaming and Internet use are positively associated with benefits for interpersonal relationships in adolescence, with these behaviors when excessive having been negatively linked with positive aspects of interpersonal connections, such as secure attachment. Using a representative sample of 7918 Portuguese adolescents, with ages ranging from 13 to 19 (M_{age} = 15.5, 53.3% females), and three self-report measures of problematic gaming, problematic Internet use, and social group attachment (secure, anxious, avoidant), this cross-sectional study aimed to examine the associations between problematic gaming, as well as problematic Internet use, and secure and insecure (anxious and avoidant) social group attachment styles, in the groups with and without these problems. In the groups without problematic gaming and without problematic Internet use, excessive gaming and involvement with the Internet were negatively associated with secure social group attachment and positively associated with anxious social group attachment; on the other hand, in the groups with severe levels of these problems, problematic gaming and Internet use were positively associated with secure social group attachment and negatively associated with anxious social group attachment. These results go against what had been initially hypothesized and suggest that in the case of adolescents with severe levels of these problems, they may serve as an effective compensatory mechanism for coping with the negative effects of insecure attachment styles, which in turn likely contributes to the maintenance of problematic gaming and Internet use.

1. Introduction

Previous research shows that Internet use and gaming, particularly common behaviors in adolescence (Wartberg et al., 2017; Öztürk & Özmen, 2016), are associated with some positive outcomes related to interpersonal relationships (e.g., overcoming real-life communication barriers, enhancing close friendships) (Lenhart et al., 2015; Sandstrom et al., 2022). Conversely, excessive Internet use and gaming (i.e., to the point of harm to the individual) are linked with negative interpersonal-related outcomes (e.g., fewer offline relationships, poorer social skills) (Affouneh et al., 2021; Li et al., 2017; Mannell, 2020), with adolescents being particularly at risk for these behaviors (Tsitsika et al., 2011). Regarding attachment specifically, previous studies have negatively linked secure attachment with excessive Internet use and gaming (Estévez et al., 2017, 2019; Monacis et al., 2017; Teng et al., 2020), and positively associated insecure attachment with these behaviors (e.g., Monacis et al., 2017; Reiner et al., 2017; Schimmenti et al., 2014). Taken together, these findings suggest that healthy levels of Internet use and gaming are associated with higher levels of secure attachment, and excessive levels of these behaviors with higher levels of insecure attachment. No previous study, to the best of the authors' knowledge, has examined social group attachment in relation to gaming and Internet use, nor explored the associations between these variables (i.e., secure/insecure attachment with gaming, as well as with involvement with the Internet) among groups of individuals with and without these behavioral problems (i.e., problematic gaming and involvement

* Corresponding author. Faculty of Social and Human Sciences, University of the Azores, Portugal, Rua da Mãe de Deus, 9500-321, Ponta Delgada, Portugal.
E-mail address: celia.mo.carvalho@uac.pt (C. Barreto Carvalho).

https://doi.org/10.1016/j.chb.2023.107932
Received 15 May 2023; Received in revised form 17 August 2023; Accepted 28 August 2023
Available online 4 September 2023

with the Internet). Furthermore, there is a lack of research examining the prevalence rates of problematic gaming and problematic Internet use in insular regions. Firstly, given this paucity of research, this cross-sectional study aims to characterize the prevalence of problematic gaming and problematic Internet use using a representative sample of adolescents living in the Azores archipelago (Portugal). Secondly, this study aims to explore gender and age differences in social group attachment, problematic gaming, and problematic Internet use. More importantly, this study aims to examine the associations between social group attachment and problematic gaming, as well as between the former and the involvement with the Internet. The former associations will be conducted among groups with and without problematic gaming and, similarly, the latter associations will be conducted among groups with and without problematic Internet use, considering the paucity of research examining these associations among these groups. Specifically, this study aims to explore the relationships between secure social group attachment, as well as two insecure attachment styles (anxious and avoidant attachment), and the previously mentioned variables.

2. Literature review and hypothesis development

2.1. Internet use and gaming

Internet use is particularly common in adolescence (Öztürk & Özmen, 2016), with gaming being one of the most frequent activities that adolescents use the Internet for (Wartberg et al., 2017; Öztürk & Özmen, 2016). Additionally, these behaviors may become problematic when excessive, with gaming being one of the most addictive online activities (Hu et al., 2019) and excessive Internet use an increasingly accepted global behavioral problem. This problem is particularly prevalent among adolescents (American Psychiatric Association [APA], 2013; Greenfield & Yan, 2006) given some of their developmental characteristics (e.g., not fully developed critical thinking skills nor sense of boundaries) (Tsitsika et al., 2011). For the sake of consistency, this study adopted the terms problematic Internet use (PIU) and problematic gaming, characterized by the excessive engagement in these behaviors to the point of causing harm to the individual (Lai & Kwan, 2017). More specifically, in this study, excessive gaming and excessive Internet use translate into high levels of the engagement in these behaviors that cause significant impairment or distress in a variety of dimensions of the person's life, in line with the DSM-IV (APA, 1994) diagnosis of pathological gambling and the DSM-5 (APA, 2013) diagnosis of internet gaming disorder. However, these problems have been conceptualized as coping mechanisms (Kardefelt-Winther, 2014a, 2014b, 2014c, 2017) that some individuals use to avoid real-life problems (e.g., loneliness, low self-esteem, stress, frustration, childhood adversity) through the engagement in virtual worlds (e.g., Chen & Chang, 2019; Colder Carras et al., 2018a,b; Colder Carras & Kardefelt-Winther, 2018; Karhulahti et al., 2022; T'ng et al., 2022). Previous research has found varying rates of adolescent PIU: 0.9%–1.7% in seven European countries (Tsitsika et al., 2014) and 16.5%–19% in Portugal (Ferreira et al., 2017; Martins et al., 2020), where this study was conducted. Regarding problematic gaming, previous studies have found rates of 1.2%–19.9% in Western countries (Fam, 2018; Gentile et al., 2017; Lemmens et al., 2015) and 14.6% in Portugal (Simões, 2017). Male adolescents have been found to show a higher prevalence of both behaviors (e.g., Pontes et al., 2014; Simões, 2017). Therefore, it is expected that:

H1. Males will display higher levels of problematic gaming and PIU.

2.2. Internet use, gaming, and interpersonal relationships

Internet use has been found to contribute to more time and a higher frequency of communications with family and friends and ultimately promotes stronger interpersonal relationships for those who have a greater online presence (Li et al., 2022). Indeed, Internet-based communication is less costly than traditional means (e.g., phone calls) (Holtzman et al., 2021), includes a vast array of ways to communicate, some of which make virtual interactions more realistic (Fibæk Bertel & Ling, 2016; Thulin, 2018) and may allow people to establish broader social connections by overcoming real-life communication barriers (Sandstrom et al., 2022). On the other hand, PIU has been positively associated with poor interpersonal relationships (Milani et al., 2009; Xu et al., 2014; for a meta-analysis, see Hao et al., 2022), leading some individuals to undervalue family and friends in real life (Kushlev et al., 2017; Tammisalo & Rotkirch, 2022), have fewer offline relationships (Mannell, 2020) and poorer social skills (Affouneh et al., 2021).

Online gaming has been found to offer an optimal space for social interactions where players give stress-buffering social support to each other (Colder Carras et al., 2018a,b; Steinkuehler & Williams, 2006) and close friendships are promoted (Lenhart et al., 2015). Research has revealed that online gaming is beneficial for shy individuals to maintain and establish social relationships (Kowert et al., 2014). Despite these findings, no association between online gaming and peer relationships in adolescence was found in one study (Chao & Yu, 2021) and gamers have been found to have a reduced offline social circle (Li et al., 2017) and compensate for this by establishing online social networks with other gamers (Leung, 2007). Lastly, research shows that when gaming becomes problematic, it loses its positive effects on interpersonal relationships; specifically, one systematic review found that increased severity of problematic gaming was associated with poorer quality of parent-child relationships (Schneider et al., 2017).

2.2.1. Internet use, gaming, and attachment

A variable that is directly related to interpersonal relationships is social group attachment, which shares many characteristics with adult attachment theory (Smith et al., 1999). Groups can be a source of protection, support, and care, and can also function as a "safe haven" (Mikulincer & Shaver, 2017), with different attachment styles being developed within groups. According to Smith et al. (1999), being securely attached to a group implies that it is perceived as safe and accepting. In contrast, when the group is perceived as unresponsive and unavailable, an insecure attachment is developed, either in terms of anxious attachment (i.e., concerns about not being accepted in the group, therefore, acting to increase proximity) or avoidant attachment (i.e., proximity to the group is seen as undesirable, hence, acting to increase distance) (Mikulincer & Shaver, 2017; Smith et al., 1999).

To the best of the authors' knowledge, there is no research examining the associations between healthy Internet use, gaming, and attachment, nor explored social group attachment in relation to any forms of Internet use and gaming. On the other hand, there is limited literature exploring the links between PIU, as well as problematic gaming, and specific forms of either secure or insecure attachment. For example, some research shows that PIU and problematic gaming are negatively associated with parental and peer attachment (Estévez et al., 2017, 2019; Teng et al., 2020). In line with this, secure attachment has been found to negatively predict PIU and problematic gaming (Monacis et al., 2017) and insecure attachment to positively predict PIU (Lin et al., 2011; Reiner et al., 2017). In addition, PIU has been found to be positively linked with both anxious and avoidant attachment styles (Schimmenti et al., 2014; Shin et al., 2011). Among late adolescents specifically, anxious attachment has been found to increase the risk of PIU (Schimmenti et al., 2014). Lastly, PIU and problematic gaming have both been found to be positively associated with anxious and avoidant attachment (Monacis et al., 2017).

Excessive gaming and Internet use is associated with an impairment in a variety of life areas (e.g., school, family) (Buzzai et al., 2021; Ko et al., 2015; Schneider et al., 2017; Xu et al., 2014). However, it is possible that they also lead to more frequent social interactions in cyberspace, thereby strengthening adolescents' interpersonal relationships. Conversely, research consistently shows that secure attachment is negatively associated with problematic gaming and PIU (Estévez et al.,

2017, 2019; Monacis et al., 2017; Teng et al., 2020). Additionally, insecure attachment styles are positively linked with these issues (Lin et al., 2011; Monacis et al., 2017; Reiner et al., 2017; Schimmenti et al., 2014; Shin et al., 2011). Thus, it is expected that:

H2. Secure social group attachment will be negatively associated and insecure attachment (i.e., anxious and avoidant attachment) positively associated with problematic gaming and the involvement with the Internet in the groups with problematic gaming and with PIU (i.e., mild, moderate, severe).

Lastly, considering the positive effects of gaming and Internet use on interpersonal relationships (as discussed above) (e.g., Colder Carras et al., 2018a,b; Fibæk Bertel & Ling, 2016; Kowert et al., 2014; Lenhart et al., 2015; Li et al., 2022; Sandstrom et al., 2022; Thulin, 2018), it is hypothesized that:

H3. Secure social group attachment will be positively associated and insecure attachment (i.e., anxious, avoidant) negatively associated with excessive gaming and involvement with the Internet in the groups without problematic gaming and without PIU (i.e., normal involvement).

This is particularly hypothesized given that participating adolescents live on relatively small islands and may use these activities at higher rates than those living in more urbanized areas to compensate for the likely limited access to social activities.

3. Research methodology

3.1. Participants

Nearly the totality of students enrolled in the Portuguese public education system (*ensino regular público*) living in a specific region in Portugal participated in the present study, which is part of a greater research project described below (in the "Procedure and Ethics" section). The sample was initially comprised of a total of 8622 adolescents, of which 704 were removed because either they did not state their age, were below the age of 13, or were older than 19 – given the small number of participants in both of these age groups ($n = 249$) and in accordance with the age range of adolescence (i.e., 10–19) defined by the World Health Organization (n.d.) – and/or did not state their school year or were in fourth or fifth grade – considering the small size of these groups ($n = 2$). The final sample comprised a total of 7918 adolescents, with ages ranging from 13 to 19 ($M = 15.5$, $SD = 1.7$) and of which 3697 (46.7%) identify with the male gender and 4218 (53.3%) with the female gender were surveyed. Only these two gender options were considered in the questionnaire, which the authors acknowledge is not in line with the current notions of gender diversity. At time of participation, most adolescents were in ninth grade (24.9%), seventh grade (22.1%), or eighth grade (21.1%), and had never failed a school year (64.6%). No data were collected about adolescents' racial/ethnic characteristics nor socioeconomic status.

3.2. Measures

3.2.1. Game Addiction Scale

The Game Addiction Scale (GAS; original version by Lemmens et al., 2009; Portuguese version by Baptista et al., 2011) is a self-report measure originally designed to assess problematic gaming in adolescents. It is composed of 21 items (e.g., "Have you failed when trying to reduce game time?"), scored on a Likert scale ranging from 1 = *Never* to 5 = *Very often*, grouped into seven three-item dimensions: salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems. Each dimension is based on the 10 diagnostic criteria from the DSM-IV (APA, 1994) for pathological gambling and each item is preceded by "How often during the last six months … ?" because addiction is considered to be present when someone meets the specified criteria during a period of six months (Young, 1998). A total score of problematic gaming, as well as subtotal scores for each dimension, were computed for each participant by summing all items, with higher scores indicating higher levels of problematic gaming. To determine problematic gaming, the polythetic format used by the DSM to diagnose pathological gambling was used, according to which a positive diagnosis requires that at least half (i.e., four) of the criteria be met. A total score of at least 12 (out of 15) for each dimension was considered to be indicative of the corresponding criterion meeting. In the original study (Lemmens et al., 2009), the total scale showed an excellent internal consistency, $\alpha = 0.92$ and $\alpha = 0.94$. The Portuguese version (Baptista et al., 2011) also found an excellent internal consistency for the total scale, $\alpha = 0.93$. In the present study, the scale also presented an excellent internal consistency, $\alpha = 0.99$, with subscales ranging from $\alpha = 0.91$ for relapse to $\alpha = 0.97$ for withdrawal. Despite the GAS being based on an outdated DSM-IV diagnosis, it is still widely used in recent cross-cultural studies (e.g., Costa et al., 2020; Oliveira et al., 2022; Zhu et al., 2021).

3.2.2. Internet Addiction Test

The Internet Addiction Test (IAT; original version by Young, 2011; Portuguese version by Pontes et al., 2014) has its roots from an earlier exploratory study by Young (1998) which measured PIU using a questionnaire comprising eight items adapted from the DSM-IV (APA, 1994) criteria for pathological gambling, with participants who met at least five of the criteria being classified as individuals with PIU. The IAT measures the degree to which a person is involved with the Internet for recreational reasons (e.g., and not for professional or academic reasons). It is a unidimensional self-report measure composed of 20 items (e.g., "Do you fear that life without the Internet would be boring, empty, and joyless?"), rated on a Likert scale ranging from 0 = *Rarely* to 5 = *Always*. A total score was computed for each participant by summing all items, with higher scores indicating higher involvement with the Internet. The cut-off proposed by the author of the scale was used, with scores 0–30 indicating normal Internet usage, 31–49 mild PIU, 50–79 moderate PIU, and 80–100 severe PIU (Young, 2011). The original study (Young, 2011) found a very good internal consistency, $\alpha = 0.84$. In the Portuguese version (Pontes et al., 2014) and in this study, the scale presented an excellent internal consistency, $\alpha = 0.90$ and $\alpha = 0.98$, respectively. Even though the IAT is based on the outdated DSM-IV diagnosis of pathological gambling, it is still widely used in recent research across a variety of countries (e.g., Costa et al., 2020; Siste et al., 2021).

3.2.3. Social Group Attachment Scale

The Social Group Attachment Scale (SGAS; original version by Smith et al., 1999; Portuguese version by Dinis et al., 2008) asks individuals to identify the social group perceived as the most important and assesses their experiences and feelings regarding this group, particularly their sense of attachment. It is a self-report measure comprising 25 items (e.g., "I do not often worry about being abandoned by my group") scored on a Likert scale ranging from 1 = *Strongly disagree* to 7 = *Strongly agree*. Multiple items are grouped into two dimensions of insecure attachment – anxiety (10 items) and avoidance (10 items). Some items are reverse-scored and a mean score for total secure social group attachment was computed by averaging all items. In the original study (Smith et al., 1999), the scale showed a good internal consistency for both dimensions, $\alpha = .86$ for attachment anxiety and $\alpha = 0.75$ for avoidance. In this study, a good internal consistency for the overall scale was found, $\alpha = 0.79$, as well as acceptable for attachment avoidance, $\alpha = 0.67$, and good for anxiety, $\alpha = 0.70$.

3.3. Procedure and ethics

This study is part of a research project that took place between 2016 and 2019 aimed to explore specific sociocultural and individual (e.g., disruptive emotional experiences, coping strategies, emotion regulation) variables influencing substance use in Portugal. This study was

approved by the Ethics Committee of a regional Portuguese university and the Portuguese Data Protection Authority (no. 13953/2017). A research protocol was developed using multiple self-report measures and questionnaires, three of which were used for this study. This protocol was administered both digitally (e.g., via an electronic link) and using a paper and pencil format to students across a Portuguese region, to maximize student participation. Participation was split into two different moments with a time interval of two weeks in-between to prevent effects of fatigue on students and maximize response accuracy.

All international ethical norms and standards regarding research involving human participants (e.g., Declaration of Helsinki), including anonymity and confidentiality of data, were complied with. All participants above the age of 18 and the underage participants' parents/legal guardians signed an informed consent form, and participation was voluntary. Data were collected in 2017 and stored online, in compliance with European Union's General Data Protection Regulation (GDPR) guidelines.

3.4. Data analysis

Data were analyzed using SPSS version 27. Preliminary discriminant validity analyses were conducted to confirm that the GAS and the IAT measure two different constructs (i.e., gaming and Internet use). Specifically, Pearson correlations were used to examine the associations between these two measures and the number of weekly hours of use of social networks, as well as between the former and reporting playing videogames as a leisure activity (0 = *No*, 1 = *Yes*). A stronger association between the number of weekly hours of use and IAT compared to that between the former and GAS, as well as a stronger association between playing videogames as a leisure activity and GAS compared to that between the former and IAT, are indicative of good discriminant validity (i.e., two measures assessing two different constructs). To test the first hypothesis, descriptive statistics (e.g., means, standard deviations) were computed for all variables studied, as well as the prevalence of problematic gaming and PIU, both in the total sample and by gender and specific age group (i.e., 13, 14, 15, 16, 17, 18 or older). To test the second hypothesis and the third hypothesis, zero-order Pearson correlations were conducted to examine the associations between social group attachment and levels of problematic gaming, both in the subsample with problematic gaming (i.e., at least four of the seven criteria were met) and in the subsample of those without it, as well as between social group attachment and levels of involvement with the Internet, both in the group of participants with normal involvement with the Internet (IAT score $\leq$30) and separately across the multiple groups of those with PIU (mild: 31 $\leq$ IAT score $\leq$49; moderate: 50 $\leq$ IAT score $\leq$79; severe: IAT score $\geq$80). Lastly, further partial correlation analyses were conducted, using gender and age as covariates; additionally, considering that problematic gaming and involvement with the Internet were strongly correlated in the present sample (r = 0.66) and online gaming has been found to be related with PIU (de Ávila et al., 2020), levels of problematic gaming (when correlating levels of involvement with the Internet with social group attachment) and levels of involvement with the Internet (when correlating levels of problematic gaming with social group attachment) were also statistically controlled for (i.e., covariates). Coefficients lower than .20 were considered weak, those between 0.20 and 0.50 were considered moderate, and those greater than 0.50 were considered strong (Ferguson, 2009). The level of statistical significance was $p < .05$ for all analyses.

4. Results

4.1. Validity analysis

To explore to what extent the GAS and the IAT measure two different constructs, their discriminant validity was examined. More specifically, Pearson correlations were conducted and compared between these measures and the number of weekly hours of use of social networks, as well as between the former measures and reporting playing videogames as a leisure activity. The positive correlation between the number of weekly hours of use of social networks and IAT ($r = 0.19$, $p < .001$) was significantly stronger than that between the former and GAS ($r = 0.11$, $p < .001$), t (5347) = 7.51, $p < .001$. Lastly, the positive correlation between playing videogames as a leisure activity and GAS ($r = 0.17$, $p < .001$) was significantly stronger than that between playing videogames as a leisure activity and IAT ($r = 0.09$, $p < .001$), t (5506) = −7.78, $p < .001$. These results provide evidence for the notion that the two measures used assess two different behavioral problems (i.e., good discriminant validity).

4.2. Descriptives

The means and standard deviations for levels of social group attachment, problematic gaming, and involvement with the Internet, as well as the rates of problematic gaming and PIU, are presented in Table 1. For secure social group attachment, adolescents showed a mean of 4.7; for attachment anxiety, a mean of 3.4; for attachment avoidance, a mean of 3.2; for problematic gaming, the sample showed a mean of 49 and a prevalence of 11.3%; for involvement with the Internet, a mean of 40.9 and rates of 26.9%, 28.9% and 7.7%, for mild, moderate, and severe PIU, respectively.

Attachment avoidance, problematic gaming, as well as moderate and severe PIU, were higher/more prevalent in males than females. Conversely, attachment anxiety was higher in females than males. No gender differences were found with regard to secure social group attachment. Significant differences between multiple age groups were found with regard to problematic gaming: the 14-year-old adolescents showed higher levels than those above the age of 18. Additionally, age differences were found with regard to PIU: moderate PIU was more prevalent in the 15-year-old adolescents and less prevalent in those who are 17 and above the age of 18. Age differences were found with regard to attachment avoidance: adolescents over the age of 18 were lower in this variable compared to those who were 13, 14 and 15. Lastly, no age differences were found regarding secure social group attachment, nor attachment anxiety.

4.3. Zero-order correlations

Zero-order Pearson correlations were conducted to explore the associations between social group attachment, and problematic gaming and involvement with the Internet, both in the groups with (i.e., at least four of the seven criteria were met) and without problematic gaming, as well as with and without PIU (i.e., normal involvement: IAT score $\leq$30; mild PIU: 31 $\leq$ IAT score $\leq$49; moderate PIU: 50 $\leq$ IAT score $\leq$79; severe PIU: IAT score $\geq$80).

4.3.1. Groups without problematic gaming and problematic internet use

In the adolescents without problematic gaming, gaming was negatively associated ($p < .001$) with secure social group attachment ($r = -0.22$) and positively associated ($p < .001$) with both dimensions of insecure social group attachment (i.e., avoidant: $r = 0.29$; anxious: $r = 0.16$). On the other hand, in those with normal levels of involvement with the Internet, Internet use was negatively associated with secure social group attachment ($r = -0.11$, $p < .001$) and with avoidant social group attachment ($r = -0.07$, $p = .004$); lastly, it was positively associated with anxious social group attachment ($r = 0.13$, $p < .001$).

4.3.2. Groups with problematic gaming and problematic internet use

In the adolescents with problematic gaming, excessive gaming was positively associated with secure social group attachment ($r = 0.14$, $p < .001$) and negatively associated with anxious social group attachment ($r = -0.18$, $p < .001$); on the other hand, excessive gaming was not linked with avoidant social group attachment ($r = 0.06$, $p = .127$). In those with

Table 1
Descriptives of problematic gaming, involvement with the Internet, and social group attachment by gender and age group.

Total sample	Problematic gaming		Involvement with the Internet				Social group attachment		
				Mild PIU	Moderate PIU	Severe PIU	Secure	Anxiety	Avoidance
	M (*SD*)	*n* (%)	*M* (*SD*)	*n* (%)	*n* (%)	*n* (%)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
	49 (23.6)	653 (11.3%)	40.9 (24.7)	1546 (26.9%)	1660 (28.9%)	444 (7.7%)	4.7 (0.7)	3.4 (0.9)	3.2 (0.9)
Gender		$\chi^2 = 169.32$***		$\chi^2 = 148.33$***			$t = 0.06$	$t = -2.99$**	$t = 5.97$***
Male	58.1 (22.8)	452 (17.3%)	44.8 (25.7)	730 (27.3%)	877 (32.8%)	282 (10.5%)	4.7 (0.7)	3.3 (0.9)	3.3 (0.9)
Female	41.3 (21.4)	201 (6.4%)	37.5 (23.3)	815 (26.5%)	783 (25.5%)	162 (5.3%)	4.7 (0.7)	3.4 (0.9)	3.1 (0.9)
Age groups		$\chi^2 = 15.79$**		$\chi^2 = 52.92$***			$F = 1.38$	$F = 1.72$	$F = 6.03$***
13 years	51.0 (23.5)	113 (12.6%)	39.5 (26.7)	210 (23.3%)	252 (28%)	80 (8.9%)	4.7 (0.7)	3.4 (0.9)	3.2 (0.9)
14 years	52.1 (23.7)	144 (14.2%)	42.5 (25.4)	248 (24.8%)	329 (32.9%)	85 (8.5%)	4.7 (0.8)	3.4 (0.9)	3.3 (0.9)
15 years	49.2 (23.6)	125 (10.5%)	42.4 (24.2)	326 (27.4%)	382 (32.1%)	85 (7.1%)	4.7 (0.7)	3.4 (0.9)	3.2 (0.9)
16 years	48.5 (23.4)	101 (10.2%)	41.0 (24.4)	268 (27%)	288 (29%)	76 (7.7%)	4.7 (0.7)	3.4 (0.9)	3.2 (0.9)
17 years	47.4 (23.5)	90 (10.9%)	40.9 (24.0)	239 (20.8%)	208 (26%)	66 (8.2%)	4.6 (0.7)	3.4 (0.9)	3.1 (0.9)
≥18 years	45.0 (23.1)	80 (9.2%)	38.4 (23.0)	255 (29.4%)	201 (23.2%)	52 (6%)	4.7 (0.7)	3.3 (0.9)	3.1 (0.9)

Note. Problematic gaming was measured using the Game Addiction Scale (GAS; Lemmens et al., 2009; Portuguese version by Baptista et al., 2011). Involvement with the Internet was measured using the Internet Addiction Test (IAT; Young, 2011; Portuguese version by Pontes et al., 2014). Social group attachment was measured using the Social Group Attachment Scale (SGAS; Smith et al., 1999; Portuguese version by Dinis et al., 2008).
*$p < .05$; **$p < .01$; ***$p < .001$.

mild PIU, excessive Internet use was negatively associated ($p < .001$) with secure social group attachment ($r = -0.09$) and positively associated with both dimensions of insecure social group attachment (avoidant: $r = 0.12$, $p < .001$; anxious: $r = 0.07$, $p = .007$). In those with moderate PIU, excessive Internet use was not linked with any dimensions of social group attachment (secure: $r = 0.05$, $p = .072$; avoidant: $r = 0.01$, $p = .608$; anxious: $r = -0.02$, $p = .496$). Lastly, in the adolescents with severe PIU, excessive Internet use was positively associated with secure social group attachment ($r = 0.23$, $p < .001$) and negatively associated with anxious social group attachment ($r = -0.27$, $p < .001$); on the other hand, it was not linked with avoidant social group attachment ($r = -0.06$, $p = .279$).

4.4. Partial correlations

Partial correlations were conducted using gender, age, and involvement with the Internet as covariates to examine the associations between problematic gaming and social group attachment, as well as between the former and both dimensions of insecure attachment (i.e., anxiety, avoidance), both in the group with and without problematic gaming. Additional partial correlations were conducted using the same sociodemographic variables (i.e., gender, age) and problematic gaming as covariates to explore the associations between the involvement with the Internet and social group attachment, as well as between the former and both dimensions of attachment (i.e., anxiety, avoidance), both in the groups with and without PIU. In all partial correlations, the directions of the significant associations, as well as the non-significant associations, were identical to the ones found in the above zero-order correlations.

4.5. Summary of correlations

These results show that adolescents without problematic gaming but with high levels of gaming tend to show lower levels of secure social group attachment and higher levels of anxious and avoidant attachment; conversely, those with problematic gaming and higher in levels of (problematic) gaming tend to display higher levels of secure social group attachment and lower levels of anxious attachment. In line with this, adolescents without PIU but higher in the degree of involvement with the Internet tend to show lower levels of secure social group attachment, as well as avoidant attachment, and higher levels of anxious attachment; those with severe PIU and higher in these levels tend to exhibit higher levels of secure social group attachment and lower levels of anxious attachment. All correlation coefficients are presented in Table 2.

5. Discussion

Using a representative sample of adolescents living on nine Azorean islands in Portugal, this cross-sectional study aimed to explore the associations between social group attachment – including secure and insecure (anxious and avoidant) attachment – and problematic gaming, as well as between the former and involvement with the Internet, in two groups: adolescents with and without problematic gaming/PIU. This study also aimed to examine gender and age differences regarding both problems. Firstly, it was hypothesized that males would show higher

Table 2
Zero-order and partial Pearson correlation coefficients between social group attachment, and problematic gaming and involvement with the Internet by problematic gaming/Internet use.

Social group attachment		Problematic gaming		Involvement with the Internet			
		Without	With	Normal	Mild PIU	Moderate PIU	Severe PIU
Secure	Zero-order	−.22***	.14***	−.11***	−.09***	.05	.23***
	Partial	−.23***	.15***	−.10***	−.10***	.04	.23***
Anxious	Zero-order	.16***	−.18***	.13***	.07**	−.02	−.27***
	Partial	.18***	−.18***	.14***	.08**	−.03	−.26***
Avoidant	Zero-order	.29***	.06	−.07**	.12***	.01	−.06
	Partial	.28***	.06	−.06*	.10***	.02	−.07

Note. Problematic gaming was measured using the Game Addiction Scale (GAS; Lemmens et al., 2009; Portuguese version by Baptista et al., 2011). Involvement with the Internet was measured using the Internet Addiction Test (IAT; Young, 2011; Portuguese version by Pontes et al., 2014). Social group attachment was measured using the Social Group Attachment Scale (SGAS; Smith et al., 1999; Portuguese version by Dinis et al., 2008). In the partial correlations, gender, age, and either problematic gaming or involvement with the Internet were statistically controlled for.
PIU = Problematic Internet use.
*$p < .05$; **$p < .01$; ***$p < .001$.

levels of problematic gaming and PIU (**H1**). Secondly, it was expected that in the group of adolescents with problematic gaming and in the group with PIU, secure social group attachment would be negatively and insecure social group attachment positively linked with excessive gaming and involvement with the Internet (**H2**). On the other hand, it was hypothesized that in the group without problematic gaming and in the group without PIU, secure social group attachment would be positively and insecure social group attachment negatively associated with excessive gaming and involvement with the Internet, respectively (**H3**).

Given the lack of research exploring the prevalence rates of problematic gaming and PIU in insular regions, this study first characterized these prevalence rates. The sample showed a prevalence of 11.3% for problematic gaming and an aggregated prevalence of 36.9% for moderate and severe PIU (IAT $\geq$50). The former rate is somewhat aligned with previous studies (1.2%–19.9%: Fam, 2018; Gentile et al., 2017; Lemmens et al., 2015, p. 14.6% in a Portuguese sample: Simões, 2017). The prevalence of adolescent PIU found is much higher than the ones found in previous research (0.9%–1.7%: Tsitsika et al., 2014, p. 16.5%–19% in Portuguese samples: Ferreira et al., 2017; Martins et al., 2020). This higher prevalence may be explained by the likely possibility that adolescents living on relatively small islands and in more rural areas (identical to those in the sample) have limited access to experiences and opportunities involving social activities. This leads to higher levels of involvement with the Internet to seek a higher number of these opportunities and puts these individuals at increased risk of PIU. Additionally, these problematic behaviors were found to be more prevalent in male adolescents, in line with previous research (e.g., Pontes et al., 2014; Simões, 2017) and supporting **H1**.

Despite the relationships between attachment, problematic gaming, and PIU having been examined in one previous study (Monacis et al., 2017), no previous study had explored these associations using groups of adolescents with and without these problems. In the group with problematic gaming and in the group with severe PIU, secure social group attachment was positively and anxious attachment negatively linked with excessive gaming and Internet use, respectively; lastly, in the group with problematic gaming and in the group with severe PIU, no significant associations were found between avoidant attachment and excessive gaming, as well as between the former and excessive Internet use, respectively, which does not support **H2**. Moreover, in the group without problematic gaming, secure social group attachment were found to be negatively and insecure (anxious and avoidant) attachment positively associated with excessive gaming; in the group without PIU, secure and avoidant social group attachment were found to be negatively and anxious attachment positively associated with excessive Internet use, which does not support **H3**. Overall, the results regarding the groups without these problems are in line with previous findings that secure attachment is negatively associated with excessive Internet use and gaming and that insecure attachment positively linked with these behaviors (Monacis et al., 2017); however, the findings regarding the groups with severe levels of these problems (i.e., positive associations between secure social group attachment and excessive Internet use and gaming, as well as negative relationships between insecure social group attachment and these behaviors) are not in line with the previously mentioned results found by Monacis et al. (2017).

Specifically, the findings that in the groups without these problematic behaviors (i.e., problematic gaming and PIU), adolescents high in excessive gaming and Internet use tended to have lower levels of secure social group attachment and higher levels of anxious attachment indicate that, despite the likely frequent social interactions established in cyberspace by these adolescents, this life area is also impaired by these behaviors, in line with previous research (e.g., Tammisalo & Rotkirch, 2022; Mannell, 2020; for a meta-analysis, see Hao et al., 2022). These findings were somewhat unexpected because it was hypothesized that in the groups without problematic gaming and PIU (**H3**), these behaviors would be negatively linked with insecure social group attachment and positively linked with secure social group attachment. This hypothesis was formulated based on previous findings that these behaviors can have positive effects on interpersonal relationships (e.g., establishing broader social connections by overcoming real-life communication barriers, promoting more time and frequency of communication with friends and family) (e.g., Li et al., 2022; Sandstrom et al., 2022). This was particularly hypothesized based on the fact that these adolescents live on relatively small islands, where there is likely a decreased access to experiences involving social activities (as discussed above).

In the group of adolescents without problematic gaming, those higher in excessive gaming showed higher avoidant attachment, which is also an unexpected finding and may be explained similarly to the above finding. On the other hand, in the group of adolescents with normal involvement with the Internet, those higher in excessive Internet use exhibited lower avoidant attachment, in line with what had been initially hypothesized. Furthermore, the opposite directions of these associations regarding avoidant attachment (i.e., positive for the group without problematic gaming and negative for the group with normal involvement with the Internet) may be due to the likely possibility that playing games often involves social interactions (e.g., online team games), something that may be absent in general Internet browsing. This makes it difficult for individuals high in avoidant attachment to not experience the negative feelings (e.g., discomfort) associated with this insecure attachment style when gaming, which increase as playing games becomes more frequent.

Lastly, in the group of adolescents with problematic gaming and in the group of those with severe PIU, individuals with higher levels of excessive gaming and Internet use (respectively) tended to exhibit higher levels of secure social group attachment and lower levels of anxious attachment. This finding suggests that in the case of adolescents with a secure social group attachment, even though the engagement in these activities (i.e., problematic gaming and PIU) is linked with an impairment in many life areas (e.g., school, family) (e.g., Buzzai et al., 2021; Schneider et al., 2017), it may enhance the social area given that these activities often involve social interactions and lead to an enhancement of the positive aspects (e.g., support, protection) related to a secure attachment style. This is particularly relevant in the case of adolescents living on islands and who are more likely to have limited access to activities involving social interactions (as discussed above). These adolescents are more likely to have a higher tendency to perceive gaming and/or the Internet as effective ways to increase the diversity of their interpersonal relationships, which contributes to their perceived feelings of social integration. Additionally, in the case of adolescents with anxious social group attachment, the engagement in these activities (i.e., problematic gaming and PIU) may serve the purpose of reducing the negative feelings associated with this insecure attachment style, which likely contributes to the maintenance of these problems and provides support for Kardefelt-Winther's (2014a,b,c, 2017) conceptualization of excessive gaming and Internet use as coping strategies. No previous studies had explored whether these activities could be used by adolescents to cope with possible negative aspects of unhealthy interpersonal relationships (in this study, insecure attachment); however, several studies have found that these activities often serve the purpose of escaping real-life problems (e.g., stress, frustration, feelings of loneliness) (e.g., Chen & Chang, 2019; Colder Carras et al., 2018a,b; Colder Carras & Kardefelt-Winther, 2018; Karhulahti et al., 2022; T'ng et al., 2022). It is likely that the use of problematic gaming and PIU as compensatory strategies also extends to the negative interpersonal-related outcomes associated with this insecure attachment style (e.g., fewer peer relationships, lower social competence) (Kokkinos et al., 2016) and its characteristics (e.g., constant concern about the possibility of abandonment and the unavailability of others). It is likely that for individuals with an anxious social group attachment style, it is easier to establish and maintain social connections in cyberspace because in this space, there are fewer indicators of social rejection (e.g., there are fewer non-verbal cues [Venter, 2019]) and there are fewer communication barriers for people with some degree of social anxiety

(Prizant-Passal et al., 2016). Also in cyberspace, others are more readily accessible (Li et al., 2022), which likely leads to a lower concern about the unavailability of others.

As said earlier, this study used an adolescent sample living in an insular and predominantly rural region (i.e., Azores), which one could argue restricts the degree of generalizability of the findings to adolescents living in other regions to some degree. However, the Azorean geographical context has similar socioeconomic characteristics to those of other Portuguese regions, such as recent birth rates (8.6% in the Azores vs. 8% in mainland Portugal) and the working population's years of education (9.6 in the Azores vs. 10.5 in mainland Portugal) (Fundação Francisco Manuel dos Santos. (n.d.-a). Given these similarities and the large sample size, the authors argue that the sample is representative of the adolescents living in Portugal, a country which in turn also shares many socioeconomic characteristics with other Western countries, including the rate of school failure (6% in Portugal vs. average of 9.6% in the EU) and the at-risk-of-poverty rate (16.4% in Portugal vs. average of 16.5% in the EU) (Fundação Francisco Manuel dos Santos. (n.d.-b). Lastly, specifically regarding factors that are related to Internet use and gaming, the adolescents living in Portugal also share a number of characteristics with those living in other Western countries, including the percentage of individuals with Internet access (100% in Portugal vs. average of 98% in the EU) and the percentage of people with basic digital skills (55% in Portugal vs. average of 54% in the EU) (Fundação Francisco Manuel dos Santos. (n.d.-b), as well as the prevalence of problematic gaming (mainland Portugal: 14.6% [Simões, 2017]; Germany: 8.9%; Spain: 7.7%; UK: 14.6%; Australia: 7%; Canada: 9.4% [Fam et al., 2018]; US: 8.5% [Gentile et al., 2017]). Therefore, the findings in this study would likely be replicated across other Western regions.

6. Conclusions

6.1. Theoretical implications

Although the excessive engagement in gaming and Internet use had already been found to be associated with an impairment in a variety of life areas (e.g., school, family), it has also been found to serve the purpose of dealing with real-life issues (e.g., frustration, loneliness). The findings of the study suggest that on the one hand, these behaviors boost the positive consequences linked to a secure attachment style and on the other hand, they also act as a buffer against the negative consequences associated with insecure attachment styles, increasing the risk that these problems will persist and providing support for the conceptualization of excessive gaming and Internet use as coping/compensatory strategies. Taken together, the results indicate that excessive gaming and Internet use play an important role in adolescents' sense of belonging and attachment.

6.2. Practical implications

These findings highlight the need for interventions aiming to reduce problematic gaming and PIU in adolescence to consider that these problems may be used as coping strategies to alleviate/compensate for the negative aspects of insecure social group attachment styles, such as difficulty with interpersonal communication and poor social skills. Therefore, these interventions should target these social aspects (e.g., assertiveness and social skills training), as well as the negative impact that problematic gaming and PIU may have on other life areas (e.g., school, family). These factors, alongside aspects related to healthy gaming and Internet use (and other forms of leisure activities involving information and communication technologies), should also be contemplated in training and psychoeducational sessions targeted toward adolescents and individuals who work closely with them.

6.3. Limitations and directions for future research

Some of the limitations of this study include its cross-sectional design, which does not allow for the accurate inference of causal relationships between the variables studied; the use of self-report measures, which may lead to the bias of social desirability on the results (e.g., an adolescent with problematic gaming or PIU answering the questionnaires in such a way that his/her problem is not accurately identified), and the use of two measures typically used to assess problematic gaming and Internet usage (as opposed to regular usage); the high lengthiness of the full research protocol used, which may have induced participant fatigue, despite the fact that participation was split into two moments. Future research should use measures of frequency of gaming and Internet use (e.g., number of daily hours) to examine whether the associations in the present study are replicated. In addition, future studies should use longitudinal designs to explore these associations over time and examine the effectiveness of interventions aimed to promote social and communication skills (which is expected to decrease the negative aspects of insecure social group attachment) using experimental and control groups. Lastly, future research should examine whether excessive gaming and Internet use also act as coping strategies for other aspects related to unhealthy relationships (e.g., low subjective quality of social relationships, low perceived social support) and for interpersonal relationships in a variety of contexts (e.g., school, family, peers).

In sum, this study found that in individuals without problematic gaming and without PIU, those with excessive gaming and involvement with the Internet tended to show lower levels of secure social group attachment and higher levels of anxious social group attachment; on the other hand, in those with problematic gaming and with PIU, secure social group attachment was positively and anxious social group attachment negatively associated with excessive gaming and Internet use. These results indicate that problematic gaming and PIU may serve as coping/compensatory strategies to alleviate the negative feelings associated with insecure attachment styles, which in turn probably contributes to the maintenance of these problems.

Funding

This research is part of a research project entitled *Vida + : Diagnostic Assessment of School Health in the Autonomous Region of the Azores*, supported by the Secretaria Regional da Saúde e Desporto of the Regional Government of the Azores.

Data sharing declaration

This manuscript's data will not be deposited.

CRediT authorship contribution statement

Célia Barreto Carvalho: Conceptualization, Funding acquisition, Project administration, Supervision, Methodology, Resources, Investigation, Validation, Formal analysis, Data curation, Writing – original draft, Preparation, Writing – reviewing and editing. **Joana Moura Cabral:** Methodology, Investigation, Formal analysis, Data curation, Writing – original draft, Preparation. **Marco Teixeira:** Methodology, Investigation, Formal analysis, Data curation, Writing – original draft, Preparation. **Filipa Cordeiro:** Methodology, Investigation, Formal analysis, Data curation, Writing – original draft, Preparation. **Rodrigo Costa:** Methodology, Investigation, Formal analysis, Data curation, Writing – original draft, Preparation. **Ana Moura Arroz:** Methodology, Investigation, Formal analysis, Data curation, Writing – original draft, Preparation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

Acknowledgments

The authors would like to express their gratitude to every participating adolescent, as well as the staff at participating schools.

References

Affouneh, S., Mahamid, F. A., Berte, D. Z., Shaqour, A. Z., & Shayeb, M. (2021). The efficacy of a training program for social skills in reducing addictive Internet behaviors among Palestinian university students. *Psicologia: Reflexão e Crítica, 34*, Article 19. https://doi.org/10.1186/s41155-021-00185-w

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). https://doi.org/10.1176/appi.books.9780890425596

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

de Ávila, G., dos Santos, E. N., Jansen, K., & Barros, F. C. (2020). Internet addiction in students from an educational institution in Southern Brazil: Prevalence and associated factors. *Trends in Psychiatry and Psychotherapy, 42*(4), 302–310. https://doi.org/10.1590/2237-6089-2019-0098

Baptista, E., Viegas, P. M. P., Gradil, S., Diniz, & Barroso, T. M. M. D. A. (2011). *Tradução e adaptação da Escala de Adição ao Jogo Eletrónico: Estudo realizado numa amostra de adolescentes portugueses*. Escola Superior de Enfermagem de Coimbra [Translation and adaptation of the Game Addiction Scale: Study conducted in a sample of Portuguese adolescents] [Unpublished manuscript].

Buzzai, C., Filippello, P., Costa, S., Amato, V., & Sorrenti, L. (2021). Problematic internet use and academic achievement: A focus on interpersonal behaviours and academic engagement. *Social Psychology of Education, 24*(1), 95–118. https://doi.org/10.1007/s11218-020-09601-y

Chao, C. M., & Yu, T. K. (2021). Internet use and adolescents' physical and mental health: The mediating role of self-consciousness and peer relationships. *International Journal of Mental Health and Addiction, 21*, 911–928. https://doi.org/10.1007/s11469-021-00631-x

Chen, C. Y., & Chang, S. L. (2019). Moderating effects of information-oriented versus escapism-oriented motivations on the relationship between psychological well-being and problematic use of video game live-streaming services. *Journal of Behavioral Addictions, 8*(3), 564–573. https://doi.org/10.1556/2006.8.2019.34

Colder Carras, M., Kalbarczyk, A., Wells, K., Banks, J., Kowert, R., Gillespie, C., & Latkin, C. (2018). Connection, meaning, and distraction: A qualitative study of video game play and mental health recovery in veterans treated for mental and/or behavioral health problems. *Social Science & Medicine, 216*, 124–132. https://doi.org/10.1016/j.socscimed.2018.08.044

Colder Carras, M., & Kardefelt-Winther, D. (2018). When addiction symptoms and life problems diverge: A latent class analysis of problematic gaming in a representative multinational sample of European adolescents. *European Child & Adolescent Psychiatry, 27*(4), 513–525. https://doi.org/10.1007/s00787-018-1108-1

Colder Carras, M., Porter, A. M., van Rooij, A. J., King, D., Lange, A., Carras, M., & Labrique, A. (2018). Gamers' insights into the phenomenology of normal gaming and game "addiction": A mixed methods study. *Computers in Human Behavior, 79*, 238–246. https://doi.org/10.1016/j.chb.2017.10.029

Costa, S., Barberis, N., Gugliandolo, M. C., Liga, F., Cuzzocrea, F., & Verrastro, V. (2020). Examination of the psychometric characteristics of the Italian version of the game addiction scale for adolescents. *Psychological Reports, 123*(4), 1365–1381. https://doi.org/10.1177/0033294119838758

Dinis, A., Matos, M., & Pinto Gouveia, J. (2008). *Validação da Escala de Vinculação ao Grupo Social na população portuguesa [Validation of the Social Group Attachment Scale in the Portuguese population*. University of Coimbra [Unpublished manuscript].

Estévez, A., Jáuregui, P., & López-González, H. (2019). Attachment and behavioral addictions in adolescents: The mediating and moderating role of coping strategies. *Scandinavian Journal of Psychology, 60*(4), 348–360. https://doi.org/10.1111/sjop.12547

Estévez, A., Jáuregui, P., Sánchez-Marcos, I., López-González, H., & Griffiths, M. D. (2017). Attachment and emotion regulation in substance addictions and behavioral addictions. *Journal of Behavioral Addictions, 6*(4), 534–544. https://doi.org/10.1556/2006.6.2017.086

Fam, J. Y. (2018). Prevalence of internet gaming disorder in adolescents: A meta-analysis across three decades. *Scandinavian Journal of Psychology, 59*(5), 524–531. https://doi.org/10.1111/sjop.12459

Ferguson, C. J. (2009). An effect size primer: A guide for clinicians and researchers. *Professional Psychology: Research and Practice, 40*(5), 532–538. https://doi.org/10.1037/a0015808

Ferreira, C., Ferreira, H., Vieira, M. J., Costeira, M., Branco, L., Dias, N., & Macedo, L. (2017). Epidemiology of internet use by an adolescent population and its relation with sleep habits. *Acta Medica Portuguesa, 30*(7–8), 524–533. https://doi.org/10.20344/amp.8205

Fibæk Bertel, T., & Ling, R. (2016). "It's just not that exciting anymore": The changing centrality of SMS in the everyday lives of young Danes. *New Media & Society, 18*(7), 1293–1309. https://doi.org/10.1177/1461444814555267

Fundação Francisco Manuel dos Santos. (n.d.-a. Statistics about Portugal and europe. Retrieved August 4, 2023, from https://www.pordata.pt/en/municipalities.

Fundação Francisco Manuel dos Santos. (n.d.-b). Statistics about Portugal and europe. Retrieved August 4, 2023, from https://www.pordata.pt/en/europe.

Gentile, D. A., Bailey, K., Bavelier, D., Brockmyer, J. F., Cash, H., Coyne, S. M., Doan, A., Grant, D. S., Green, C. S., Griffiths, M., Markle, T., Petry, N. M., Prot, S., Rae, C. D., Rehbein, F., Rich, M., Sullivan, D., Woolley, E., & Young, K. (2017). Internet gaming disorder in children and adolescents. *Pediatrics, 140*(Suppl 2), S81–S85. https://doi.org/10.1542/peds.2016-1758H

Greenfield, P., & Yan, Z. (2006). Children, adolescents, and the internet: A new field of inquiry in developmental psychology. *Developmental Psychology, 42*(3), 391–394. https://doi.org/10.1037/0012-1649.42.3.391

Hao, Q. H., Peng, W., Wang, J., Tu, Y., Li, H., & Zhu, T. M. (2022). The correlation between internet addiction and interpersonal relationship among teenagers and college students based on pearson's correlation coefficient: A systematic review and meta-analysis. *Frontiers in Psychiatry, 13*, Article 818494. https://doi.org/10.3389/fpsyt.2022.818494

Holtzman, S., Kushlev, K., Wozny, A., & Godard, R. (2021). Long-distance texting: Text messaging is linked with higher relationship satisfaction in long-distance relationships. *Journal of Social and Personal Relationships, 38*(12), 3543–3565. https://doi.org/10.1177/02654075211043296

Hu, E., Stavropoulos, V., Anderson, A., Scerri, M., & Collard, J. (2019). Internet gaming disorder: Feeling the flow of social games. *Addictive Behaviors Reports, 9*, Article 100140. https://doi.org/10.1016/j.abrep.2018.10.004

Kardefelt-Winther, D. (2014). A conceptual and methodological critique of internet addiction research: Towards a model of compensatory internet use. *Computers in Human Behavior, 31*, 351–354. https://doi.org/10.1016/j.chb.2013.10.059

Kardefelt-Winther, D. (2014). Problematizing excessive online gaming and its psychological predictors. *Computers in Human Behavior, 31*, 118–122. https://doi.org/10.1016/j.chb.2013.10.017

Kardefelt-Winther, D. (2014). The moderating role of psychosocial well-being on the relationship between escapism and excessive online gaming. *Computers in Human Behavior, 38*, 68–74. https://doi.org/10.1016/j.chb.2014.05.020

Kardefelt-Winther, D. (2017). Conceptualizing Internet use disorders: Addiction or coping process? *Psychiatry and Clinical Neurosciences, 71*(7), 459–466. https://doi.org/10.1111/pcn.12413

Karhulahti, V. M., Nerg, H., Laitinen, T., Päivinen, A., & Chen, Y. (2022). *Eight hypotheses on technology use and psychosocial wellbeing: A bicultural phenomenological study of gaming during the COVID-19 pandemic. Current psychology*. Advance online publication. https://doi.org/10.1007/s12144-022-03586-x

Kokkinos, C. M., Kakarani, S., & Kolovou, D. (2016). Relationships among shyness, social competence, peer relations, and theory of mind among pre-adolescents. *Social Psychology of Education, 19*(1), 117–133. https://doi.org/10.1007/s11218-015-9317-7

Ko, C. H., Wang, P. W., Liu, T. L., Yen, C. F., Chen, C. S., & Yen, J. Y. (2015). Bidirectional associations between family factors and Internet addiction among adolescents in a prospective investigation. *Psychiatry and Clinical Neurosciences, 69*(4), 192–200. https://doi.org/10.1111/pcn.12204

Kowert, R., Domahidi, E., & Quandt, T. (2014). The relationship between online video game involvement and gaming-related friendships among emotionally sensitive individuals. *Cyberpsychology, Behavior, and Social Networking, 17*(7), 447–453. https://doi.org/10.1089/cyber.2013.0656

Kushlev, K., Proulx, J. D. E., & Dunn, E. W. (2017). Digitally connected, socially disconnected: The effects of relying on technology rather than other people. *Computers in Human Behavior, 76*, 68–74. https://doi.org/10.1016/j.chb.2017.07.001

Lai, F. T. T., & Kwan, J. L. Y. (2017). Socioeconomic influence on adolescent problematic Internet use through school-related psychosocial factors and pattern of Internet use. *Computers in Human Behavior, 68*, 121–136. https://doi.org/10.1016/j.chb.2016.11.021

Lemmens, J. S., Valkenburg, P. M., & Gentile, D. A. (2015). The internet gaming disorder scale. *Psychological Assessment, 27*(2), 567–582. https://doi.org/10.1037/pas0000062

Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2009). Development and validation of a game addiction scale for adolescents. *Media Psychology, 12*(1), 77–95. https://doi.org/10.1080/15213260802669458

Lenhart, A., Smith, A., Anderson, M., Duggan, M., & Perrin, A. (2015). *Teens, technology & friendships: Video games, social media and mobile phones play an integral role in how teens meet and interact with friends*. Pew Research Center. https://www.pewresearch.org/internet/2015/08/06/teens-technology-and-friendships/.

Leung, L. (2007). Stressful life events, motives for Internet use, and social support among digital kids. *Cyberpsychology, Behavior, and Social Networking, 10*(2), 204–214. https://doi.org/10.1089/cpb.2006.9967

Li, S., Hietajärvi, L., Palonen, T., Salmela-Aro, K., & Hakkarainen, K. (2017). Adolescents' social networks: Exploring different patterns of socio-digital participation. *Scandinavian Journal of Educational Research, 61*(3), 255–274. https://doi.org/10.1080/00313831.2015.1120236

Li, C., Ning, G., Xia, Y., Guo, K., & Liu, Q. (2022). Does the internet bring people closer together or further apart? The impact of internet usage on interpersonal

communications. *Behavioral Sciences, 12*(11), 425. https://doi.org/10.3390/bs12110425

Lin, M. P., Ko, H. C., & Wu, J. Y. (2011). Prevalence and psychosocial risk factors associated with internet addiction in a nationally representative sample of college students in Taiwan. *Cyberpsychology, Behavior, and Social Networking, 14*(12), 741–746. https://doi.org/10.1089/cyber.2010.0574

Mannell, K. (2020). Plural and porous: Reconceptualizing the boundaries of mobile messaging group chats. *Journal of Computer-Mediated Communication, 25*(4), 274–290. https://doi.org/10.1093/jcmc/zmaa007

Martins, M. V., Formiga, A., Santos, C., Sousa, D., Resende, C., Campos, R., Nogueira, N., Carvalho, P., & Ferreira, S. (2020). Adolescent internet addiction – role of parental control and adolescent behaviours. *International Journal of Pediatrics and Adolescent Medicine, 7*(3), 116–120. https://doi.org/10.1016/j.ijpam.2019.12.003

Mikulincer, M., & Shaver, P. R. (2017). Augmenting the sense of attachment security in group contexts: The effects of a responsive leader and a cohesive group. *International Journal of Group Psychotherapy, 67*(2), 161–175. https://doi.org/10.1080/00207284.2016.1260462

Milani, L., Osualdella, D., & Di Blasio, P. (2009). Quality of interpersonal relationships and problematic Internet use in adolescence. *Cyberpsychology, Behavior, and Social Networking, 12*(6), 681–684. https://doi.org/10.1089/cpb.2009.0071

Monacis, L., de Palo, V., Griffiths, M. D., & Sinatra, M. (2017). Exploring individual differences in online addictions: The role of identity and attachment. *International Journal of Mental Health and Addiction, 15*(4), 853–868. https://doi.org/10.1007/s11469-017-9768-5

Oliveira, T. D. O., Costa, D. S., Alvim-Soares, A., de Paula, J. J., Kestelman, I., Silva, A. G., Malloy-Diniz, L. F., & Miranda, D. M. (2022). Children's behavioral problems, screen time, and sleep problems' association with negative and positive parenting strategies during the COVID-19 outbreak in Brazil. *Child Abuse & Neglect, 130*(Pt 1), Article 105345. https://doi.org/10.1016/j.chiabu.2021.105345

Öztürk, E., & Özmen, S. K. (2016). The relationship of self-perception, personality and high school type with the level of problematic internet use in adolescents. *Computers in Human Behavior, 65*, 501–507. https://doi.org/10.1016/j.chb.2016.09.016

Pontes, H. M., Patrão, I. M., & Griffiths, M. (2014). Portuguese validation of the Internet Addiction Test: An empirical study. *Journal of Behavioral Addictions, 3*(2), 107–114.

Prizant-Passal, S., Shechner, T., & Aderka, I. M. (2016). Social anxiety and internet use – a meta-analysis: What do we know? What are we missing? *Computers in Human Behavior, 62*, 221–229. https://doi.org/10.1016/j.chb.2016.04.003

Reiner, I., Tibubos, A. N., Hardt, J., Müller, K., Wölfling, K., & Beutel, M. E. (2017). Peer attachment, specific patterns of internet use and problematic internet use in male and female adolescents. *European Child & Adolescent Psychiatry, 26*(10), 1257–1268. https://doi.org/10.1007/s00787-017-0984-0

Sandstrom, G. M., Boothby, E. J., & Cooney, G. (2022). Talking to strangers: A week-long intervention reduces psychological barriers to social connection. *Journal of Experimental Social Psychology, 102*, Article 104356. https://doi.org/10.1016/j.jesp.2022.104356

Schimmenti, A., Passanisi, A., Gervasi, A. M., Manzella, S., & Famà, F. I. (2014). Insecure attachment attitudes in the onset of problematic Internet use among late adolescents. *Child Psychiatry and Human Development, 45*(5), 588–595. https://doi.org/10.1007/s10578-013-0428-0

Schneider, L. A., King, D. L., & Delfabbro, P. H. (2017). Family factors in adolescent problematic internet gaming: A systematic review. *Journal of Behavioral Addictions, 6*(3), 321–333. https://doi.org/10.1556/2006.6.2017.035

Shin, S. E., Kim, N. S., & Jang, E. Y. (2011). Comparison of problematic internet and alcohol use and attachment styles among industrial workers in Korea. *Cyberpsychology, Behavior, and Social Networking, 14*(11), 665–672. https://doi.org/10.1089/cyber.2010.0470

Simões, C. A. S. (2017). *Dependência de videojogos, psicopatologia e autocontrolo: Estudo numa população adolescente [Videogame addiction, psychopathology, and self-control: Study in an adolescent population] [Master's dissertation, University of Coimbra*. Scientific Repository of the University of Coimbra. https://estudogeral.uc.pt/handle/10316/82670.

Siste, K., Suwartono, C., Nasrun, M. W., Bardosono, S., Sekartini, R., Pandelaki, J., Sarasvita, R., Murtani, B. J., Damayanti, R., & Wiguna, T. (2021). Validation study of the Indonesian internet addiction test among adolescents. *PLoS One, 16*(2), Article e0245833. https://doi.org/10.1371/journal.pone.0245833

Smith, E. R., Murphy, J., & Coats, S. (1999). Attachment to groups: Theory and measurement. *Journal of Personality and Social Psychology, 77*(1), 94–110. https://doi.org/10.1037//0022-3514.77.1.94

Steinkuehler, C. A., & Williams, D. (2006). Where everybody knows your (screen) name: Online games as "third places.". *Journal of Computer-Mediated Communication, 11*(4), 885–909. https://doi.org/10.1111/j.1083-6101.2006.00300.x

Tammisalo, K., & Rotkirch, A. (2022). Effects of information and communication technology on the quality of family relationships: A systematic review. *Journal of Social and Personal Relationships, 39*(9), 2724–2765. https://doi.org/10.1177/02654075221087942

Teng, Z., Griffiths, M. D., Nie, Q., Xiang, G., & Guo, C. (2020). Parent-adolescent attachment and peer attachment associated with internet gaming disorder: A longitudinal study of first-year undergraduate students. *Journal of Behavioral Addictions, 9*(1), 116–128. https://doi.org/10.1556/2006.2020.00011

Thulin, E. (2018). Always on my mind: How smartphones are transforming social contact among young Swedes. *Young, 26*(5), 465–483. https://doi.org/10.1177/1103308817734512

T'ng, S. T., Ho, K. H., & Pau, K. (2022). Need frustration, gaming motives, and Internet gaming disorder in Mobile Multiplayer Online Battle Arena (MOBA) games: Through the lens of self-determination theory. *International Journal of Mental Health and Addiction*. https://doi.org/10.1007/s11469-022-00825-x. Advance online publication.

Tsitsika, A., Critselis, E., Louizou, A., Janikian, M., Freskou, A., Marangou, E., Kormas, G., & Kafetzis, D. A. (2011). Determinants of internet addiction among adolescents: A case-control study. *The Scientific World Journal, 11*, 866–874. https://doi.org/10.1100/tsw.2011.85

Tsitsika, A., Janikian, M., Schoenmakers, T. M., Tzavela, E. C., Olafsson, K., Wójcik, S., Macarie, G. F., Tzavara, C., & Richardson, C. (2014). Internet addictive behavior in adolescence: A cross-sectional study in seven European countries. *Cyberpsychology, Behavior, and Social Networking, 17*(8), 528–535. https://doi.org/10.1089/cyber.2013.0382

Venter, E. (2019). Challenges for meaningful interpersonal communication in a digital era. *HTS Theological Studies, 75*(1), a5339. https://doi.org/10.4102/hts.v75i1.5339

Wartberg, L., Kriston, L., Bröning, S., Kegel, K., & Thomasius, R. (2017). Adolescent problematic Internet use: Is a parental rating suitable to estimate prevalence and identify familial correlates? *Computers in Human Behavior, 67*, 233–239. https://doi.org/10.1016/j.chb.2016.10.029

World Health Organization. (n.d.). Adolescent health. www.who.int/health-topics/adolescent-health.

Xu, J., Shen, L.-X., Yan, C.-H., Hu, H., Yang, F., Wang, L., Kotha, S. R., Ouyang, F., Zhang, L.-N., Liao, X.-P., Zhang, J., Zhang, J.-S., & Shen, X.-M. (2014). Parent-adolescent interaction and risk of adolescent internet addiction: A population-based study in shanghai. *BMC Psychiatry, 14*, Article 112. https://doi.org/10.1186/1471-244X-14-112

Young, K. S. (1998). *Caught in the Net: How to recognize Internet addiction and a winning strategy for recovery*. Wiley.

Young, K. S. (2011). Clinical assessment of Internet-addicted clients. In K. Young, & C. Abreu (Eds.), *Internet addiction: A handbook and guide to evaluation and treatment* (pp. 19–34). John Wiley & Sons.

Zhu, S., Zhuang, Y., Lee, P., Li, J. C., & Wong, P. W. C. (2021). Leisure and problem gaming behaviors among children and adolescents during school closures caused by COVID-19 in Hong Kong: Quantitative cross-sectional survey study. *JMIR Serious Games, 9*(2), Article e26808. https://doi.org/10.2196/26808