

Family factors in adolescent problematic Internet gaming: A systematic review

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Background and aims: Familial influences are known to affect the likelihood of an adolescent becoming a problem gamer. This systematic review examined some of the key findings in empirical research on family factors related to adolescent problem gaming. **Methods:** A total of 14 studies in the past decade were evaluated. Family-related variables included: (a) *parent status* (e.g., socioeconomic status and mental health), (b) *parent–child relationship* (e.g., warmth, conflict, and abuse), (c) *parental influence on gaming* (e.g., supervision of gaming, modeling, and attitudes toward gaming), and (d) *family environment* (e.g., household composition). **Results:** The majority of studies have focused on parent–child relationships, reporting that poorer quality relationships are associated with increased severity of problem gaming. The paternal relationship may be protective against problem gaming; therefore, prevention programs should leverage the support of cooperative fathers. **Discussion:** The intergenerational effects of problem gaming require further attention, in light of adult gamers raising their children in a gaming-centric environment. Research has been limited by a reliance on adolescent self-report to understand family dynamics, without gathering corroborating information from parents and other family members. The very high rates of problem gaming (>10%) reported in general population samples raise concerns about the validity of current screening tools. **Conclusions:** Interventions for adolescents may be more effective in some cases if they can address familial influences on problem gaming with the active co-participation of parents, rather than enrolling vulnerable adolescents in individual-based training or temporarily isolating adolescents from the family system.

Keywords: Internet gaming disorder, addiction, family, adolescence, risk, DSM-5

INTRODUCTION

Internet gaming activities play a major role in the leisure and social pursuits of adolescents. Research has identified benefits associated with normal engagement in gaming, such as improved relationships with family (Durkin & Barber, 2002) and peers (Kuntsche et al., 2009; Valkenburg & Peter, 2009), as well as some physical and cognitive benefits (Blumberg, Alschuler, Almonte, & Mileaf, 2013; Subrahmanyam, Greenfield, Kraut, & Gross, 2001). However, excessive gaming can increase the risk of depression and anxiety (King, Delfabbro, Zwaans, & Kaptis, 2013), and negative impact on school achievement, exercise, and sleep (Ferguson, Coulson, & Barnett, 2011; Kim et al., 2010). In 2013, Internet gaming disorder (IGD) was proposed as a condition warranting further study in Section III of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013). The IGD classification aimed to improve consistency in the conceptualization of gaming-related problems, which had interchangeably been referred to as an “addiction,” “pathology,” “syndrome,” or “impulse control disorder,” among other terms (King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013). The DSM-5 IGD category has also been used to guide interventions for adolescents who screen positively for problem gaming (King et al., 2017). Given some interventions for Internet addiction (including

gaming) have employed family approaches (e.g., Liu et al., 2015), or involved modification of family-related variables (e.g., parent–child communication) (Yeun & Han, 2016), it was considered timely to evaluate the evidence based on family factors related to problematic gaming behaviors in adolescence.

Several familial influences, such as the parent–child relationship, parental restriction and monitoring of media use, and parents’ marital and socioeconomic status, may affect the likelihood that an adolescent becomes a problem gamer. A large body of empirical research has examined the association between adolescents’ electronic media use and family functioning, with much of this work drawn from East Asian populations (Koo and Kwon 2014; Xiuqin et al., 2010); however, studies with a specific focus on problem gaming are less common. Chiu, Lee, and Huang (2004) reported that Taiwanese youth from families with higher functioning relationships had much lower levels of problematic gaming. The authors suggested that family functioning may be protective against problem gaming because more diligent family members are likely to direct the adolescent’s attention away from games and toward other

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activities. Similarly, a study of 600 adolescents by Jeong and Kim (2011) reported that less engagement with family activities was associated with problematic gaming. It is often unclear from these studies and others whether family and gaming variables are in fact causally related. Excessive gaming may displace opportunities for family interaction, or poor family relationships may lead an adolescent to seek out social engagement in gaming activities (Wang & Wang, 2013). Another possibility is a third, more underlying factor, such as a developmental disorder, might explain a preference for gaming and lack of normal bonding or social interests.

Research studies of parental restriction and monitoring of gaming appear to be more equipped to examine the impact of parenting style. This is because the line of questioning is often more explicit in reference to the parents' influence on gaming, asking questions such as *Do you set limits on how long your child can play games?* However, there is still uncertainty about whether parents are aware of the extent of gaming activities and whether parental restrictions or other strategies are consistently employed. This may partly consider for the mixed findings in relation to parental supervision and problem gaming (Choo, Sim, Liau, Gentile, & Khoo, 2015; Kwon, Chung, & Lee, 2011; Liau et al., 2015; Rehbein & Baier, 2013). It may also depend on whether parents' restrictiveness or permissiveness had preceded or developed after the gaming problem began. For example, in a study of 2,021 adolescents, Wu, Wong, et al. (2016) reported that parental restriction was 1.9 times higher in adolescents who used the Internet excessively compared with other adolescents. More restrictive parents may attempt, perhaps unsuccessfully, to respond to gaming problems after they have emerged or restriction may increase the adolescent's desire for gaming, thereby creating a vicious cycle of further restriction and increasing parent-child conflict.

Other studies report that adolescents with family relational trauma may use online activities as a coping mechanism. Schimmenti, Passanisi, Gervasi, Manzella, and Fama (2014) surveyed 310 young adults to assess problematic Internet use and relational trauma. They reported that problematic Internet users were significantly more likely to have suffered childhood experiences of physical and sexual abuses and report insecure attachment attitudes. Another study by Schimmenti, Guglielmucci, Barbasio, and Granieri (2012) surveyed 250 players of massively multiplayer online games about their attachment styles. Almost half (47%) of the problem gamers reported features of disorganized attachment and playing to escape from painful memories of abuse. These findings highlight the complex family backgrounds in some cases of problem gaming, the limitations of basic demographic surveys for capturing this information, and the challenge of addressing a gaming problem when gaming may be seen as the only viable coping strategy in an unstable, rejecting, or risky family environment (Li et al., 2016).

In response to the perceived growing public health threat of problem gaming, there has been an increase in prevention studies targeting adolescent gaming (King et al., 2017). A meta-analysis by Yeun and Han (2016) identified 37 studies, including a total of 1,490 participants, with most conducted

in schools, usually in groups, and employing cognitive-behavioral strategies and other training programs. The majority of these studies (36/37) have been conducted in South Korea. A report by Lim (2012) provides a useful account of the reasons that young people in East Asian regions may be particularly vulnerable to problem gaming. Lim stated that the growing accessibility and affordability of gaming resulting from industrialization, the declining birth rate and single-child family structure (e.g., the one-child policy in China), and cultural and familial pressures to attain high academic achievement have led to lonely, stressed, and shamed adolescents who retreat into Internet cafes. Standard interventions in these regions have involved stress management, self-discipline, and thought challenging (Yeun & Han, 2016), on the assumption that this equips the adolescent to better handle familial and cultural expectations and reduce reliance on gaming. It may be debated whether such interventions can in fact address familial influences that drive problem gaming behaviors, including the possibility that certain programs may reinforce shame and resentment by punishing adolescents and isolating them from their parents (e.g., "boot camp" approaches; see Koo, Wati, Lee, & Oh, 2011) or indirectly absolving the parent of offering support or having other responsibilities by not including them in interventions.

The present review

The objective of this review was to summarize the research on family factors associated with adolescent problem gaming. The aim was to identify the factors with consistent links to problem gaming, while highlighting potential weaknesses or inconsistencies for the attention of future research. A critical examination of this literature may help researchers and practitioners to pay greater attention to more external influences, particularly modifiable variables that could be targeted in interventions, rather than focusing on the personality traits, capabilities, and difficulties of a vulnerable population. Reviewing familial influences may also inform holistic models of problem gaming and related behavioral addictions.

METHODS

Inclusion criteria

The scope of this review included quantitative studies of adolescent problem gaming published in the last decade (2007–2016). This time frame (10 years) was chosen because (a) it was a standard time frame in reviews and (b) gaming activities had not greatly changed within this period, in terms of their online capabilities and presence within the family home. To be eligible for inclusion, studies were required to include a measure of problem gaming, present data on participants aged under 18 years, and include at least one family-related variable. Family-related variables included: (a) *parent status* (e.g., gender, socioeconomic status, and mental health), (b) *parent-child relationship* (e.g., warmth, conflict, and abuse), (c) *parental influence on gaming* (i.e., supervision of gaming, modeling, and attitudes toward

gaming), and (d) *family environment* (e.g., household composition and quality of family relationships). Note that the term “parent” is used to refer collectively to the primary carer of the child and includes primary caregivers who are not biological parents.

Identification of studies

Database searches were conducted using the following databases: *Medline*, *PsycINFO*, *Academic Search Complete*, *Psychology and Behavioral Sciences Collection* (via EBSCOhost), *Web of Science*, and *ScienceDirect*. Each database was searched by one of the authors (LAS) in July 2016. The search terms and logic were developed by two authors (LAS and DLK). Searches involved combinations of keywords, subject headings, and MeSH terms. Each database required some minor adjustments due to variations in functionality. For example, where one database enabled searching by “subject headings,” another enabled keyword searches only. Search terms were arranged into four groupings reflecting: (a) family factors, (b) problem gaming, (c) technology-related term (e.g., “video gaming” and “Internet”), and (d) the population of interest. The four groupings were separated by “AND” to ensure essential components were captured by the search. The complete search results and reference list for each database search are available from the corresponding author.

Figure 1 presents a summary of the search and inclusion process for this review. The database searches identified a total of 5,039 manuscripts across the six databases. After removing duplicates, 3,678 articles remained for the next

stage of screening. The evaluation of titles and abstracts resulted in 3,573 studies being excluded due to not meeting inclusion criteria. Two studies were identified from the reference lists of those included articles. Of the 105 full-text articles evaluated by the first author and an independent reviewer, a total of 14 studies were identified as suitable for review.

Data extraction

Table 1 presents an overview of the extracted information from the 14 studies. These included authors and date, country of data collection, sample size, age of participants (mean, standard deviation, and range), study population, study design, problem gaming measurement, family factors under study, and the main findings and significance of the study.

RESULTS

Study design and context

Nine of the 14 studies were cross-sectional survey studies. The remaining five were longitudinal survey studies, with follow-up at 1 year (Choo et al., 2015; Zhu et al., 2015), 2 years (Liau et al., 2015), 3 years (Da Charlie et al., 2011), and 5 years (Rehbein & Baier, 2013). Most studies were conducted in East Asian nations, including Singapore (n = 3), South Korea (n = 3), Taiwan (n = 1), China (n = 1), and Hong Kong (n = 1), with remaining studies from Germany

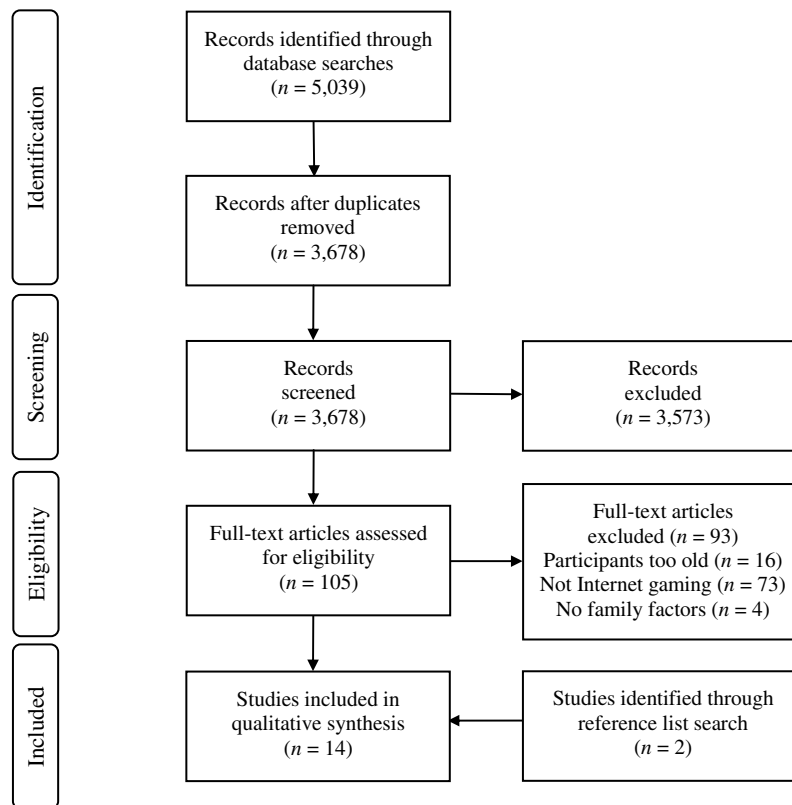


Figure 1. Flow diagram of study selection

Table 1. Summary of recent research on family factors underlying problematic Internet gaming among adolescents

Authors	Country	N	Age range	Sample	Design	IGD measure	Family factors	Findings
Choo et al. (2015)	Singapore	2,974	10–14	School students	1-year longitudinal survey	Modified DSM-IV-TR pathological gambling criteria	Parent-child closeness Parental restriction on child's video gaming	Higher parent-child closeness at baseline was associated with decreased problem gaming symptoms of 1 year later. Parental restriction of video gaming had no effect on pathological gaming. The effect of parent-child closeness on gaming was stronger in boys than girls.
Da Charlie, HyeKyung, and Khoo (2011)	Singapore	2,527	10–18	School students	3-year longitudinal survey	Modified DSM-IV-TR pathological gambling criteria	Parent-child relationship Family environment	Pathological gamers perceive their family environment as being less comfortable, and more argumentative, than normal gamers. Problem gamers reportedly have weaker parental relationships, particularly with fathers, than normal gamers.
Jeong and Kim (2011)	South Korea	600	12–15	School students	Cross-sectional survey	Modified Young's Internet Addiction Scale (translated)	Social activities with parents Gaming activities with parents	Gaming addiction scores were: Negatively associated with self-efficacy in real world Positively associated with social efficacy in virtual world Negatively associated with social activities with parents Negatively related to parental attitude toward gaming

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Kim and Kim (2015)	South Korea	624	Not reported	School students	Cross-sectional survey	IGAS	Parent-child attachment Adolescents' attitude toward parents' parenting Socioeconomic status	Internet gaming addiction was negatively associated with strength of parental attachment. Adolescent problematic gamers reported higher scores on parental rejection than normal adolescents.
Kwon et al. (2011)	South Korea	1,136	12–15	School students	Cross-sectional survey	Modified Young's Internet Addiction Scale (translated)	Perceived parent-child relationship Parental supervision	Internet gaming addiction was positively associated with parent hostility toward the child, and negatively associated with parent affection and supervision. Problematic gamers reported gaming to escape from their self and reality.
Liau et al. (2015)	Singapore	3,034	Not clear	School students	2-year longitudinal survey	Modified DSM-IV-TR pathological gambling criteria	Parent-child closeness Parental involvement in child's media use Parental supervision Family environment	Parent-child connectedness and a warm family environment were protective factors against pathological gaming at 2-year time point. Improvements in family environment related to decreased problem gaming and increased emotion regulation skills among adolescents.
Rehbein, Kleimann, and Mossle (2010)	Germany	15,168	14–16	School students	Cross-sectional survey	VGDS ICD-10 dependency	Parental education Parental physical abuse	When included in a model with a large number of predictor variables, childhood physical abuse was not a significant predictor of problematic video gaming.

(Continued)

Table 1. (Continued)

Authors	Country	N	Age range	Sample	Design	IGD measure	Family factors	Findings
Rehbein and Baier (2013)	Germany	406	Time 1: 9–10; Time 2: 14–16	School students	5-year longitudinal survey	CSAS	Single/two-parent household Parental devotion Parental supervision Conflict between parents Parental physical abuse	Children from single-parent households were at increased risk of video game addiction, possibly due to fewer resources for alternative leisure activities. There was a negative relationship between CSAS score and paternal devotion and parental supervision. Problematic Internet use and electronic gaming were associated with living in poorer functioning family. Increased prevalence of problematic gaming behavior in children with parents with histories of mental problems. Adolescents with experiences of family maltreatment and bullying had increased the probability of problematic gaming, but these relationships were not causal.
Rikkers, Lawrence, Hafekost, and Zubrick (2016)	Australia	6,310 carers 2,967 children	4–17	Community sample	Cross-sectional survey	Instrument adapted from EU Kids Online Survey	Family type Parental education/occupation Parental mental health Family functioning	
Vadlin, Astlund, Hellstrom, and Nilsson (2016)	Sweden	Study 1: 1,868 Study 2: 242	Study 1: 12–16 Study 2: 12–18	Community and clinical samples	Cross-sectional survey	GAIT	Threats and violence between parents Threats and violence between parent/s and child	
Wang et al. (2014)	Hong Kong	503	12–18	School students	Cross-sectional survey	Chinese version of short-form GAS	Parental education Parental marital status Family economic status Family harmony	Gaming addiction was correlated with degree of perceived family disharmony, which included relationship quality, level of obedience, and level of care received from a parent.

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Wu, Ko, Wong, Wu, and Oie (2016)	Taiwan	2,104	12–13	School students	Cross-sectional survey	Modified CIAS	Parental gaming attitudes Parental gaming use Parental gaming invitations	Weak correlation between gaming-related positive expectancy and parental gaming attitudes, parental Internet game use, and parental invitation to play Internet games. Severity of problem gaming positively associated with frequency of parental gaming and invitation to play games.
Zhu, Zhang, Yu, and Bao (2015)	China	833	11–14	School students	1-year longitudinal survey	Modified Young's IAS (translated)	Parent-child relationship	Low quality parent-adolescent relationship predicted Internet gaming addiction indirectly through school connectedness and enhancement of affiliation with deviant peers.
Zorbaz, Ulas, and Kizildag (2015)	Turkey	396	9–12	School students	Cross-sectional survey	SGAC	Family relationships Parental education	Negative family relationships, specifically discouraging parenting style, were a predictor of problem gaming.

Note. CIAS: Chen Internet Addiction Scale, IAS: Internet Addiction Scale, IGAS: Internet Game Addiction Scale for Korean adolescents, CSAS: Children's Separation Anxiety Scale, GAIT: Gaming Addiction Identification Test, GAS: Gaming Addiction Scale, SGAC: Scale of Game Addiction for Children, VGDS: Video Game Dependency Scale.

($n = 2$), Australia ($n = 1$), Sweden ($n = 1$), and Turkey ($n = 1$). The majority of studies were conducted in either primary, middle, or secondary schools, or a combination of these contexts (Choo et al., 2015; Da Charlie et al., 2011; Jeong & Kim, 2011; Kim & Kim, 2015; Kwon et al., 2011; Liao et al., 2015; Rehbein & Baier, 2013; Rehbein et al., 2010; Wang et al., 2014; Wu, Ko, et al., 2016; Zhu et al., 2015; Zorbaz et al., 2015).

Two studies presented nationally representative survey data (Rehbein et al., 2010; Rikkers et al., 2016). Vadlin et al. (2016) recruited a prospective community-based cohort and a sample of adolescents seeking first contact with child and adolescent psychiatric clinics in Sweden. All studies with one exception (Rikkers et al., 2016) surveyed only the child or adolescent and did not collect data from the parent or caregiver, or another external rater. The mean sample size of the included studies was 2,894 ($SD = 4,214$) and ranged from 396 participants (Zorbaz et al., 2015) to 15,168 participants (Rehbein et al., 2010). Not including Rehbein et al. (2010), the mean sample size was 1,793 ($SD = 1,674$).

Problem gaming: Measurement

There was a considerable variability in problem gaming instrumentation. Three studies (Choo et al., 2015; Da Charlie et al., 2011; Liao et al., 2015) employed a screening tool based on the DSM-IV-TR pathological gambling criteria (American Psychiatric Association, 2000). Three studies (Jeong & Kim, 2011; Kwon et al., 2011; Zhu et al., 2015) employed modified and translated versions of the Young Internet Addiction Test (Young, 1998). Two studies (Rehbein & Baier, 2013; Rehbein et al., 2010) used measures based on the ICD-10 (World Health Organization, 1992). Six studies employed modified and/or translated instruments (Kim & Kim, 2015; Rikkers et al., 2016; Vadlin, Åslund, & Nilsson, 2015; Wang et al., 2014; Wu, Wong, et al., 2016; Zorbaz et al., 2015). Although not consistently reported, the prevalence estimates of problem gaming (or “gaming addiction,” as it was often termed) were high, including figures of 9.8% (Vadlin et al., 2016), 9.9% (Choo et al., 2015; Liao et al., 2015), 11.7% (Da Charlie et al., 2011), 13.4% (Kim & Kim, 2015), and 15.6% (Wang et al., 2014).

Family factors: Overview of variables

The most frequently studied family factor was the *parent–child relationship*, which was presented in 11 studies. This factor was assessed with self-report measures of parent–child closeness or attachment in seven studies (Choo et al., 2015; Da Charlie et al., 2011; Kim & Kim, 2015; Kwon et al., 2011; Liao et al., 2015; Rehbein & Baier, 2013; Zhu et al., 2015). In the remaining studies, the parent–child relationship was inferred by the adolescent’s perceptions of the family environment, family harmony, parenting quality, and social engagement with parents (Jeong & Kim, 2011; Rikkers et al., 2016; Wang et al., 2014; Zorbaz et al., 2015). Only three studies distinguished between maternal and paternal relationships (Da Charlie et al., 2011; Kim & Kim, 2015; Rehbein & Baier, 2013). All measurements of the parent–child relationship involved a self-report survey.

Studies did not include interviews, observations, or external reports to complement the surveys.

The second most common factor was *parent status*. Eight studies examined variables related to the parent/s, such as marital status ($n = 3$; Rehbein & Baier, 2013; Rikkers et al., 2016; Wang et al., 2014), mental health status (Rikkers et al., 2016), and socioeconomic status ($n = 7$; Choo et al., 2015; Kim & Kim, 2015; Rehbein & Baier, 2013; Rikkers et al., 2016; Wang et al., 2014; Zhu et al., 2015; Zorbaz et al., 2015). Four studies used proxy measures of socioeconomic status, including house size and type (i.e., government housing, private, etc.; Choo et al., 2015) and parental education (Rehbein et al., 2010; Wang et al., 2014; Zorbaz et al., 2015). In Kwon et al.’s (2011) study, the school administrators informed the researchers that most students were from middle socioeconomic class families.

The third factor was *parental influence on gaming*. Five studies examined parent’s knowledge and attitudes toward gaming, parental involvement in gaming, and parental supervision of the adolescent’s activities (including supervision of non-gaming activities) (Choo et al., 2015; Jeong & Kim, 2011; Liao et al., 2015; Rehbein & Baier, 2013; Wu, Ko, et al., 2016). Of the 14 studies, only three specifically asked participants about parental restriction of Internet gaming (Choo et al., 2015; Liao et al., 2015; Rehbein & Baier, 2013). These three studies contained survey questions about parental restriction of certain types or genres of games and limits on the duration of gaming time.

The final and least studied variable was parental abuse of the child, which was assessed in three studies, all conducted in Europe. Rehbein et al. (2010) investigated the frequency of severe physical abuse sustained by the child before the age of 12 years, whereas Rehbein and Baier (2013) asked participants whether they had sustained physical abuse from a parent in the past 4 weeks. Rehbein and Baier (2013) included a survey item related to conflict between parents. Vadlin et al. (2016) examined family maltreatment with items concerning threats and violence between parents, and between parent and child.

Family factors: Main findings

The most consistent finding was a poorer parent–child relationship that was associated with increased problem gaming (Choo et al., 2015; Da Charlie et al., 2011; Kim & Kim, 2015; Zhu et al., 2015). Related findings included: (a) problem gamers spent less time engaged in social activities with their parents (Jeong & Kim, 2011), (b) problem gamers reported greater parental hostility and less parental affection (Kwon et al., 2011), and (c) problem gamers reported receiving lower quality parenting (Kim & Kim, 2015) and having a worse family environment compared with normal gamers (Da Charlie et al., 2011; Rikkers et al., 2016; Wang et al., 2014; Zorbaz et al., 2015). The three studies that differentiated between paternal and maternal relationships reported inconsistent findings. For example, paternal devotion was negatively correlated with problem gaming, whereas maternal devotion was not significant (Rehbein & Baier, 2013). In Kim and Kim’s (2015) study, both maternal and paternal rearing attitudes

and alienation scores were negatively correlated with problem gaming, but paternal trust and communication were not significantly related to problem gaming. Finally, in Da Charlie et al.'s (2011) study, problem gamers reported better relationships with mothers than fathers, but overall had poorer relationships with both parents than normal gamers.

Longitudinal studies reported that a positive parent–child relationship may ameliorate the risk for later problem gaming or reduce existing problem gaming symptoms. Liau et al. (2015) reported that parent–child connectedness and positive perceptions of the family environment were protective against later problem gaming, and that greater warmth in the family environment was associated with decreases in problem gaming. Choo et al. (2015) reported that greater parent–child closeness at baseline was associated with fewer symptoms of problem gaming at 1-year follow-up, particularly for male gamers. Zhu et al. (2015) reported that the relationship between negative parent–child relationship and problem gaming was mediated by decreasing school connectedness and greater association with deviant peers.

Adolescents from single-parent (Rehbein & Baier, 2013) and blended (Rikkens et al., 2016) families were at greater risk of reporting problem gaming than those from two-parent families. However, Wang et al. (2014) found no significant effect of parental marital status on gaming problems. Choo et al. (2015) reported that living in private housing, which reflected the highest level of socioeconomic status, was negatively related to symptoms of problem gaming, whereas six other studies found no relationship between socioeconomic status and gaming problems. Problem gaming was more prevalent among adolescents with parents with histories of mental health issues (Rikkens et al., 2016).

Studies on parental attitudes toward gaming and parental gaming behavior have produced inconsistent findings. Wu, Ko, et al. (2016) reported significant positive relationships between the frequency of parental gaming, the frequency of parental invitations to play games, and adolescent problem gaming. Jeong and Kim (2011) reported that negative parental attitudes toward gaming were associated with more symptoms of problem use. In two studies (Kwon et al., 2011; Rehbein & Baier, 2013), parental supervision was negatively associated with problem gaming, whereas two other studies reported no significant associations (Choo et al., 2015; Liau et al., 2015). Only one of the three studies that examined parental physical abuse reported that adolescents with a history of maltreatment were more likely to report problem gaming (Vadlin et al., 2016).

Further findings from longitudinal studies

Longitudinal studies support the notion that the parent–child relationship can influence the likelihood of developing problem gaming behavior. Choo et al. (2015) reported that greater parent–child closeness at baseline was associated with decreased problem gaming 1 year later. They also reported that parental restriction of gaming at baseline had no effect on problem gaming 1 year later, irrespective of the quality of the parent–child relationship. Liau et al. (2015) reported that both parent–child connectedness and a warm

family environment at baseline were protective factors for problem gaming at 2-year follow-up. Moreover, greater family warmth at baseline was associated with reductions in problem gaming 1 year later. Zhu et al. (2015) reported that the longitudinal relationship between parent–child relationship and problem gaming was mediated by school connectedness and deviant peer affiliation. A 5-year longitudinal study by Rehbein and Baier (2013) reported that increased paternal devotion and higher parental supervision in childhood predicted lower rates of problem gaming in adolescence. A 3-year study by Da Charlie et al. (2011) reported that problem gaming was associated with reductions in the quality of the parent–child relationship over time. While there was no initial difference between problem and normal gamers in terms of their parent–child relationships, by the third year, problem gamers reported significantly poorer relationships with their parents.

DISCUSSION

This review examined the frequently overlooked role of family factors in adolescent problem gaming. A consistent finding in this review was poorer quality of the parent–child relationship that was associated with increased severity of problem gaming. Both maternal and paternal relationships were negatively associated with problem gaming, with longitudinal evidence indicating that the paternal bond in particular was a protective factor against problem gaming. Long-term adolescent problem gaming also has marked negative effects on the family system. One longitudinal study reported an increasing deterioration of the parent–child relationship over a 3-year period following onset of problem gaming (Da Charlie et al., 2011). This review shows that parenting can increase the risk of problem gaming in multiple ways. For example, Zhu et al.'s (2015) study reported that the parent–child relationship may influence problem gaming via the mediating influence of decreasing school connectedness and greater association with deviant peers. The negative familial influence on gaming behavior may therefore be more pronounced when it impacts on the adolescent's sense of belonging across multiple social contexts.

The findings of this review underscore the need for families to be involved in interventions for adolescents exhibiting symptoms of problem gaming. The family approach to problem gaming, while less researched than individual-based therapies (Yeun & Han, 2016), has already been trialed with some successful outcomes. For example, a study by Liu et al. (2015) assessed a family-based intervention, which involved reducing high and unreasonable expectations and criticism by parents, and identifying alternative ways for adolescents to satisfy needs for competence and relatedness. The authors reported that the rate of problem gaming reduced from 100% at baseline to only 4.8% at the end of the intervention. The rate of problem gaming was only 11.1% at the 3-month follow-up assessment. Such a finding demonstrates the value of recognizing and conceptualizing the dysfunctional family dynamics in cases of adolescent problem gaming. Prevention approaches that focus on working with adolescents only may be perceived

by the adolescent as blaming and fail to address one of the primary reasons for using games excessively.

Studies of parental supervision and gaming have produced some mixed evidence. While Kwon et al. (2011) and Rehbein and Baier (2013) reported negative associations between parental supervision and problem gaming, Liau et al. (2015) found no such relationship. Similarly, in Choo et al.'s (2015) longitudinal study, level of parental supervision did not influence subsequent development of problem gaming. Notably, the studies by Liau et al. (2015) and Choo et al. (2015) only measured the parental supervision of adolescent gaming, whereas the studies by Kwon et al. (2011) and Rehbein and Baier (2013) included more general measures of parental supervision and involvement in adolescents' activities [e.g., "When I am outside, my mother knows where I am" (Kwon et al., 2011)]. These differences suggest that parental monitoring and regulation of gaming devices may not be effective on their own, but broader parental supervision and involvement are required. Educational materials and awareness campaigns should, therefore, consider promoting messages on supervision of gaming media within broader statements on parental care and responsibility.

There was some evidence that parental modeling can impact on adolescents' gaming attitudes and behaviors. Potential intergenerational effects of problem gaming may become increasingly relevant as more children are born to parents who play games or have gaming histories. Positive parental attitudes toward gaming and greater parental involvement in gaming were associated with increased gaming by adolescents. Liau et al. (2015) reported that parents who modeled high levels of gaming increased the risk of having children engaged in excessive gaming, irrespective of the restrictions on gaming in the household. Therefore, gaming restrictions and monitoring may be compromised by parents if their modeling is inconsistent with their rules and restrictions. Given that males are known to be generally more likely to play games excessively (Ferguson et al., 2011), fathers may tend to be the stronger negative modeling influence. On this basis, including cooperative fathers who play games in family-based interventions for adolescents may be beneficial to all parties.

Adolescents from single-parent or blended families were reportedly at greater risk of problem gaming than those from two-parent families. This was consistent with studies of problematic Internet use (Ko, Yen, Yen, Lin, & Yang, 2007; Lam, Peng, Mai, & Jing, 2009; Li, Garland, & Howard, 2014; Tsitsika et al., 2011; Yen, Yen, Chen, Chen, & Ko, 2007), but multiple reasons could account for these differences. First, it may reflect an adolescent's desire to escape from the stress of a complex family situation (e.g., a strained relationship with a step-parent). Second, adolescents living with a single parent may direct greater frustration toward this parent or wish to seek out surrogate parental figures, thereby making the opportunities for stress release and social connectivity in online games more appealing. It is also possible that adolescents in single-parent families have fewer opportunities for alternative activities due to the parent having less time and fewer resources to support the adolescent's interests. Another, less studied, variable was

parental physical abuse, which was positively associated with problem gaming in one of the three studies. Vadlin et al. (2016) reported that adolescents with a history of family maltreatment were 2.5 times more likely to be problem gamers. The sensitive nature of this topic may make it difficult to examine effectively in self-report survey studies, particularly in the school context where the adolescent may fear personal information being disclosed. The intersection of adolescent gaming issues with complex family backgrounds also presents challenges for interventions. There may be special circumstances where a family-based approach, or the involvement of specific guardians or family members, is contraindicated due to irresolvable conflicts or risk issues. Collaboration and respect between parent and adolescent are essential to overcome this barrier. As noted by Ramirez et al. (2011), parental restriction of screen time was only effective when there was joint agreement on the rules. When there was disagreement, parents tended to implement more rules that led to increased media use by the adolescent.

It is often assumed that adolescents with family-related difficulties engage in gaming not only to escape but also to seek out more comfortable or less threatening online relationships (Caplan, 2010; King & Delfabbro, 2014). However, studies have not yet examined the types of social connectivity that occur in adolescent gaming and how they may relate to problem gaming. There may be varying risks across types of games based on their capability to facilitate social status, group bonds, and obligations among players. For example, some online games with cooperative elements may be used to satisfy an adolescent's need for social inclusion and desire for acceptance and validation by others. In contrast, skill-based games with online ranking systems may meet an adolescent's need to be recognized for achievement or mastery, which may be lacking in their family environment. In addition to these varying online gaming subcultures, this review highlights the need to consider family factors within the relevant cultural context. Current knowledge of the families of adolescent problem gamers is predominantly based on East Asian experiences, and it is likely that family dynamics and responses to gaming problems vary across regions.

Limitations and future directions

This review has limitations that warrant acknowledgment. Many of the identified studies predated the DSM-5 IGD classification, and therefore, some inconsistency in screening for problem gaming should be expected. This review focused on problem gaming, as distinct from general Internet use, which has a larger research base, and therefore, some studies of potential relevance may have been excluded. Studies not published in English were also not identified by the search protocol. The methods of this review highlighted the consistencies in results but did not provide meta-analytic insights. Relatedly, the presented analysis considered familial factors discretely to identify general trends across studies, rather than examining interactions among familial influences with other variables.

The family factors documented in this review may provide a useful guide for further empirical research. Like

other areas of investigation into IGD, the research base is limited by inconsistent approaches to screening, and the high prevalence rates of IGD (>10%) in general population samples suggest a need for more careful delineation of normal and problem gaming. There is also a relative lack of longitudinal studies and no family interview-based studies, which would offer major advantages over cross-sectional surveys. Relying on cross-sectional surveys may affect the quality of detail and understanding of the causal pathways between family factors and adolescent problem gaming. Future research could include a more comprehensive assessment of family factors to examine potential interactions. Finally, studies should recruit from youth mental health services to include verified clinical cases.

CONCLUSIONS

Although problem gaming is a growing area of study, relatively less research has assessed the important role of familial influences on adolescent gaming and problem gaming. This may reflect an unintended bias to consider adolescents in much the same way as adults, as independent, autonomous individuals, rather than a special population whose gaming tends to occur and interact within a family system. This review found that almost all studies on family factors have not collected data from families, but have instead relied on adolescents' own insight and view of family dynamics. Notably, too, the same screening tools used in studies of adult gamers are also used for adolescents, including children as young as 10 years old (e.g., Choo et al., 2015), with reported prevalence rates that exceed other known mental disorders in this population (e.g., 15%; Wang et al., 2014). Considering adolescents as adults may overlook relevant contributing factors that explain the development of problem gaming, particularly when problems can be traced to families with fewer nurturing relationships, less structure and more conflict, and low support for alternative activities. The influence of the family system is vitally important to address within interventions for adolescents.

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