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Group-Based Interventions for Adolescents with Gaming Disorder or Problematic Gaming Behavior: A Systematic Review

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Abstract

Purpose of Review Although gaming disorder (GD) is prevalent during adolescence and group-based interventions (GBIs) prove highly beneficial for substance use disorders, much remains unknown regarding their utility for addressing problematic gaming (PG) and GD. This systematic review thus explores the potential value of GBIs for adolescents with PG/GD.

Recent Findings With the inclusion of PG/GD as a potential diagnosis by the American Psychiatric Association in 2013 and the acceptance of GD as a psychological disorder by the World Health Organization in 2019, research on this topic has proliferated. Although reviews to date have accorded attention to cognitive behavioral therapy, technology-based interventions, or focused on broader conditions such as "Internet addiction," none has exclusively focused on GBIs or adolescent populations.

Summary The findings from the eight retained studies suggest a positive impact of GBIs on adolescent PG/GD. Nonetheless, the particular benefits of "the group" as a modality remained largely unaddressed. Future research should adopt more rigorous designs to understand its underlying mechanisms.

Keywords Gaming disorder · Problematic gaming · Group intervention · Group treatment · Adolescents

Introduction

Prior to and after the formal acceptance by the World Health Organization of gaming disorder (GD) as a diagnosable clinical entity [1], practitioners and researchers developed and implemented psychological treatments to address gaming-related harms. GD is characterized by a pattern of persistent or recurrent (online or offline) gaming behavior, manifested by impaired control over gaming, increasing priority given to gaming over other life interests and daily activities, and the continuation or escalation of gaming despite negative consequences [2–5]. GD appears to be most prevalent among adolescents and young adult males between 12 and 20 years old, thus posing a risk for academic underachievement, school failure/dropout, and psychosocial and sleep problems [3–6]. This higher prevalence in adolescent populations necessitates a targeted approach to GD and problematic gaming (PG) behaviors (reflected by high amounts of time spent gaming or gaming motives that predict the development of GD, but presently do not rise to the level of GD [7–9]). Yet, little is known about effective interventions for adolescent populations and the underlying dynamics at work. As Stevens et al. [10] asserted: "It is necessary to determine which treatments are most effective for whom and under which conditions" [p. 191]. Furthermore, to maintain the effects of treatment over time, standard programs of therapy (which include elements of cognitive behavioral therapy (CBT) and individual and family treatment approaches [10–13]) should be enhanced with "additional support" [11 p. 201]. One such form of support may be group-based interventions (GBIs) that can be part of indicated prevention measures, early intervention, or treatment.

Reports from clinical practice and research demonstrate the particular benefits of GBIs when treating adolescents [14, 15•, 16]. GBIs are typically delivered to small groups (5 to 10 people) by one or more practitioners and are used for

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mental health recovery, behavior change, and other aims [17•]. GBIs are the most commonly used treatment modality for adolescents with substance use disorders [16]. Given that adolescent GD shares etiological and phenomenological characteristics with adolescent substance use disorder, GBIs have untapped potential for addressing GD/PG [18].

The potential benefits of GBIs for behavior change include creating a conducive space for sharing by decreasing isolation, as well as for identification with and learning from other group members who experience similar problems [17•]. Notwithstanding these benefits, some potential challenges in delivering group interventions lie in "deviancy training," "the process of contingent positive reactions to rule-breaking discussions" [20 p. 756]. Similarly, sustain talk (statements against change) by some of the group members can have an iatrogenic effect on peers when the facilitator does not address the ambivalence that they may have concerning their gaming behavior [19]. Therefore, "the group could spiral into a discussion about the benefits" of gaming, leading to decreased intentions toward change [21 p. 76]. Adolescents may vary in their gaming behavior severity and readiness for change, thus requiring skillful facilitation to prevent iatrogenic effects. Moreover, and of importance, much remains unknown concerning the potential benefits of GBIs for adolescents with GD/PG.

Against this backdrop, the objectives of this systematic review were to address the challenges and opportunities inherent in group-based treatment for adolescents with GD/PG and to delineate future clinical research and implementation directions. Our main focus was to determine the effectiveness of GBIs in terms of symptom reduction, motivational enhancement, and other indicators, as well as to explore in which combination with other interventions GBIs are used. To the best of our knowledge, this is the first systematic review to explore the value of GBIs for adolescents with GD/PG.

Methods

This systematic review of the literature was performed following PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines [20]. The protocol was also registered with the International Prospective Register of Systematic Reviews (PROSPERO, CRD42023399423). From the conceptualization of the search strings to the synthesis of results, the process was performed by two authors (H.B. and D.L.S.) in close consultation with the co-authors. We consulted four academic databases (Web of Science, Scopus, PubMed, and ProQuest) to identify relevant studies. For each database, we combined search algorithms for the following concepts: (1) GD/PG, (2) group treatment, and (3) adolescence. The full algorithms per database are available in Appendix 1. The final search was conducted on the 21st of February 2023. Following peer review, the search was repeated on the 7th of February 2024 for articles published between February 2023 and January 2024. The search strategy was informed by comparable review articles [11, 12, 21], three relevant studies known to the authors [22, 23, 24•], and consultation with an academic librarian. For searches in PubMed, MeSH (Medical Subject Headings) terms were retrieved and added to the search string. The search strategies were validated by testing whether they could identify the three known studies, which was the case in all four databases.

Published peer-reviewed articles were retained for consideration depending on whether they corresponded to the following population, intervention, comparator, outcome, and study design (PICOS) criteria [25]: (P) focusing on an adolescent target group (aged 12–18 years), (I) applying a group treatment approach (involving a minimum of five participants), (C) use of a comparison condition, (O) analyzing impact on GD/PG, and (S) application of an intervention study design. Articles predating the year 2000 were omitted because they would exclude online gaming. Only English-language studies were retained. We also only included studies that explicitly stated that individuals with GD were part of the sample. Given the focus on reducing the impact of gaming behavior in persons with mild to severe GD symptoms, we excluded universal prevention programs and included indicated prevention/early intervention strategies if all other criteria were met. Only quantitative study designs were eligible, provided they centered on interventions and were not theoretical or prevalence studies.

The initial search yielded 2946 results (1174 in Scopus, 794 in ProQuest, 530 in Web of Science, and 448 in PubMed). These results were processed according to the PRISMA guideline steps depicted in Fig. 1 and with the assistance of rayyan.ai software. The initial removal of duplicates led to the retention of 1308 articles to be screened by their title and abstracts. Twenty-three articles were found to match the search criteria, and their full texts were subsequently retrieved. One full-text article written in German could not be retrieved [26]. From the remaining retrieved articles, five were excluded due to language (French [27]; German [28, 29]) and publication type [30, 31].

As a result, 17 articles were found to match the search criteria and were subjected to a synchronous dual full-text reading and discussion to appraise their overall relevance to our research question. When the two authors involved in the review were not certain about the inclusion of a specific paper, a third author (W.V.) was consulted. This step led to the further deletion of ten articles: six did not focus on GD/PG severity as an outcome indicator [32–37]; two did not focus on adolescents [38, 39]; one consisted of a

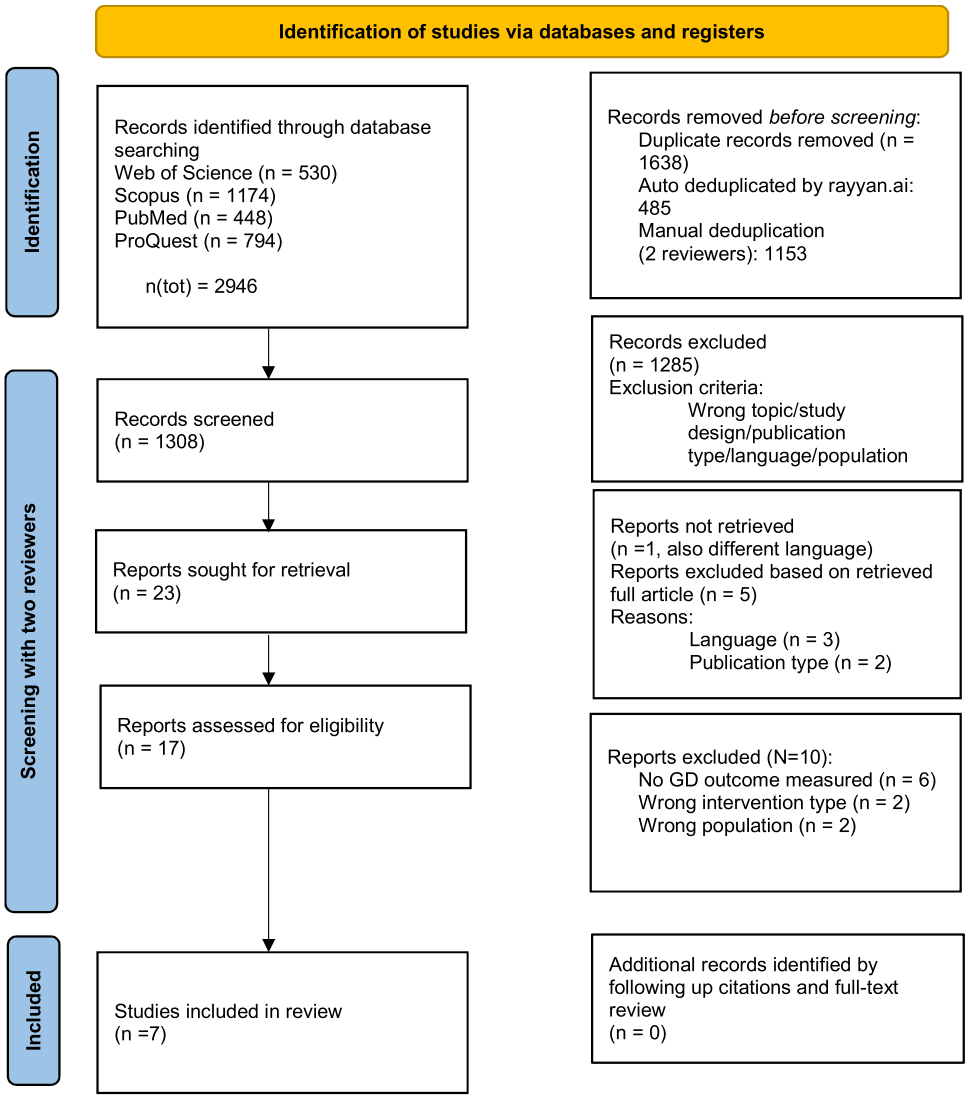

Fig. 1 PRISMA flow diagram of the literature search and selection process

one-shot school-based intervention of 90 min, which could not be classified as being an indicated prevention [40]; and one involved a study design that did not introduce a group-based approach other than recreational school exercise [41]. Lastly, the reference lists of the retained articles were scrutinized to identify other potentially relevant studies. No additional articles were included after reference mining. Hence, seven papers were included in the current systematic literature review. The second round of database searches led to the inclusion of another study (see Appendix 2).

The following data were systematically extracted from the included studies: (a) names of the authors, year of publication, and country where the intervention was implemented, (b) characteristics of the sample (sample size, age, gender ratio) and description of the intervention setting, (c) description of the GBI (aim and conceptualization), (d) description of complementary interventions to the group intervention (if any), (e) underlying theoretical framework for the intervention, (f) measures used in the study (e.g., questionnaires, observations, and interviews) and conceptualization of GD/PG (diagnostic criteria used for GD), and (g) study results reported (outcomes measured). An assessment of each study's methodological quality was also conducted by using the Quality Assessment with Diverse Studies (QuADS) appraisal tool [42].

Results

Table 1 presents a summary of the key characteristics of the seven included studies.

Included Studies on GBIs for Adolescents with GD/PG

Our search yielded eight articles on GBIs for adolescents with GD/PG that were conducted in Europe (Ukraine [43],

Germany [24•, 44]) and Asia (China [51], Thailand [22], Iran [46], the Philippines [48], and Japan [23]). As a reflection of the rise in studies on interventions for GD/PG in recent years, all included articles were published in the last 7 years (2017–2023). Treatment settings varied from schools [44, 46, 51] to outpatient clinics [24•, 43, 48] and residential treatment facilities [22, 23].

Aim

None of the included studies sought abstinence from gaming. Rather, they aimed at controlled use [24•], healthy gaming [22], reducing symptom severity [43, 44, 46, 48, 51], improved psychological well-being [48, 51], reduction in time spent gaming [23, 51], and gaming motivation [51].

Description of the GBIs

GBIs were only one part of the program in four publications, alongside complementary approaches such as family group therapy [43], parental skill training/psychoeducation [22, 43, 46], or individual treatment sessions [23, 43].

Group size varied between 3[1] and 32 participants, and four studies [23, 24•, 43, 44] were conceptualized according to standard group psychotherapy sizes (5–10 persons [17•]). Two of the GBIs were offered within a residential treatment setting [22, 23]. Aside from these, sessions varied in terms of both number (between 4 and 10 sessions) and duration (between 90 min and 3 h). Interventions were delivered by clinical psychologists, student mentors, trained mental health professionals, and medical doctors. All interventions focused on emotional or behavioral change via cognitive restructuring (i.e., CBT). There was a difference in how this was approached, as some interventions were limited to psychoeducation [e.g., 46, 49]. Two interventions included experiential activities such as hiking, woodwork, sports, and cooking [22, 23]. One intervention [51] added a motivational component to the CBT protocol, fostering the discovery and use of participants' strengths in real-life activities. The content of the interventions centered on sharing and confronting one's own beliefs [e.g., 45, 47], functional emotional regulation skills training [e.g., 26], and the detrimental effects of excessive gaming on everyday life [e.g., 48].

In terms of measures, some studies assessed the construct of "Internet addiction" more broadly by using self-designed measures (e.g., test questionnaire to detect cyber-addiction [43]) or existing scales (Griffith's [50] Six Components Model [23]; Meerkerk et al.'s [45] Compulsive Internet Use Scale [24•, 44]). Lemmens' Game Addiction Scale was used in three of the included studies as a self-rating scale [24•, 44, 46] and also modified to a parental scale [24•, 44]. Another study [22] made use of a self-designed test (Game Addiction Screening Test [53]), which was administered only by proxy. Other instruments used were the nine-item Internet Gaming Disorder Scale ([48, 49]) and the Chen Internet Addiction Scale-Gaming version (CIAS-G; 55). Despite the time frame of this review, none of the measures of GD is based on the ICD-11 criteria [1].

All included studies relied on CBT as the therapeutic framework for the intervention (e.g., rational emotive behavior therapy [43]; Theory of Planned Behavior [46], and integrated cognitive behavioral therapy (ICBT) [51]). Although the group approach was mainly based on CBT, several studies offered complementary interventions consisting of an integration of mindfulness [48], (systemic) family therapy [43], communication theory [22, 43], parent management training [22, 46], and adventure therapy [22, 23]. These aforementioned studies were based on the therapeutic residential camp (TRC) model, which comprises 12 days of camp-style residence [35].

Outcomes on GD/PG Severity

All studies sought to decrease GD/PG symptoms and reported successfully achieving this goal to varying degrees. It is worth noting that studies differed in their conceptualization of GD/PG as reflected in their terminology, which we have used here to retain their meaning. In the following text, studies are referred to as study 1, study 2, and so forth, based on their order of appearance in the data extraction table (Table 1).

In the first study [43], in which "closed Group Psychocorrection Sessions with 'Addicts'" focused on "game addiction" as one form of cyber-addiction, participants ($n = 131$ adolescents) reported a general reduction in the degree of gaming addiction between baseline and immediate follow-up assessments. Severe gaming addiction was reduced by 27%, whereas mild gaming addiction increased by 18% (i.e., those with a formerly severe addiction reported lower severity). An average of 8% of participants showed no signs of gaming addiction at follow-up.

In study 2 [44], a sample of 167 school-going adolescents who presented with high or moderate risk for GD were included in the PROTECT program, an indicated preventive group intervention. A greater reduction in symptom severity of GD or unspecified Internet use disorder was shown in comparison with that in the control group ($n = 255$), thus reflecting a 12.1% greater reduction of symptoms (baseline vs. 12-month follow-up). The effect size increased over time, and an initial increase in symptom severity (or problem awareness) at post-test was detected. There was no reported

[1] The PROTECT + study [24•] included 11 groups with sizes varying from three to seven participants. A group size of three is too small for our inclusion criteria, but this study used multiple groups.

Table 1 Characteristics of included studies

Authors (year) country	Sample and setting	Intervention (aim and conceptualization)	Complementary interventions	Underlying theory	Measurements and diagnostic criteria for GD	Results/outcome
1. Asieieva et al. (2022) Ukraine [43]	$N=408$ No control group Three groups, based on age (14–15, 16–18, and 19–21 years) and gender with signs of addiction 1. 59 boys and 65 girls from 14 to 15 years old 2. 72 boys and 76 girls from 16 to 18 years old 3. 67 men and 69 women from 19 to 21 years old Public Utility "Student Health Clinic" of the Odesa City Council, NGO "LGBT Association League"	A. "Reduce severity of cyber-addiction in 5 domains (computer addiction (PC), Internet addiction, game addiction, gadget addiction, cybercommunication addiction, and selfitis)" B. Closed group psycho-correction sessions with "addicts" included five 90-min sessions with 8–12 people Analysis of thinking and identification of irrational beliefs; confrontation of these beliefs and their revision; mitigation of these beliefs and requirements, with the emergence of new already rational beliefs	1. Family therapy, including: Group social and communicative training for adolescents and their parents, comprising six 2-h training sessions 2. Individual psycho-correction sessions, including: • 8 sessions (40–60 min) of Acceptance and Commitment Therapy and Eye Movement Desensitization and Reprocessing–based therapy • 3 sessions (60 min) parent consultation	1. CBT: rational emotive behavior therapy 2. ACT and EMDR are mentioned in the individual psycho-correction approach 3. Intra- and extra-family communication skills	Pre- and post-measurement "test questionnaire to detect cyber-addiction," including 102 questions, rated on a 5-point scale to determine the severity (3 degrees) of the 5 mentioned types of cyber-addictions	Positive changes among respondents with gaming addiction, as well as for other types of cyber-addictions measured at baseline. There is a significant decrease in the degree of addiction. It was found that the percentage of "addicts" with the 3rd degree of addiction decreases, and the number of people with the 1st and 2nd degree of addiction increases. There was a category of people who stopped showing signs of pathological addiction, and in all groups, this percentage varied from 5 to 10% of respondents
2. Lindenberg, Kindt, and Szasz-Janocha (2022) Germany [44]	$N=322$ Intervention: $n=167$ Control group: $n=255$ Age 12–18 years In 33 high schools from 1 region Exclusion of adolescents with gaming disorder ($N=6$) Only high or moderate risk for GD included	A. "To reduce the symptom severity and prevent full syndrome and subthreshold onset of gaming disorder and unspecified Internet use disorder in at-risk adolescents" B. PROTECT is a cognitive behavioral therapy (CBT)–based indicated preventive group intervention. Consists of four 90-min sessions and is delivered by 2 trained psychologists	None mentioned	CBT: Targets changes in addictive reward processing and pathological cognitive mechanisms	Paper-and-pencil assessment: baseline, 1-, 4-, and 12-month follow-up 1. Compulsive Internet Use Scale [45] cutoff, 20 (moderate and high risk were enrolled at screening) 2. Computerspielabhängigkeitsskala (modified German video game dependency scale; score range, 0–56, with higher scores indicating greater pathology) 3. The clinical interview covered the 9 DSM-5 criteria for Internet gaming disorder that were adapted for gaming disorder and unspecified Internet use disorder separately (214 questions in total) Secondary endpoints were also measured by using German translations of the following questionnaires: 4. *Procrastination:* Procrastination Questionnaire 5. *General psychopathology:* Strengths and Difficulties Questionnaire 6. *Depression*: Depression Inventory for Children and Adolescents 7. *Social anxiety:* Social Interaction Anxiety Scale 8. *Performance anxiety and school anxiety:* Fear Survey Schedule for Children 9. *Emotion regulation strategies:* a part of the Questionnaire for the assessment of Emotion Regulation in Children and Adolescents (60 fear and sadness items) 10. *Social behavior and learning behavior*: Student Assessment List for Social and Learning Behavior 11. S*elf-efficacy:* General Self-Efficacy Scale	Compared with the control group, the PROTECT group showed a significantly greater reduction in symptom severity of gaming disorder or unspecified Internet use disorder ($\gamma_{11}=-0.128$; 95% confidence interval (CI), −0.246 to −0.011; $P=0.03$), reflecting a 39.8% vs/ 27.7% reduction in symptoms, with an effect size of Cohen $d=0.67$ (baseline vs. 12-month follow-up) for the PROTECT group. Differences in incidence rates did not reach statistical significance. The PROTECT group showed a significantly greater decrease in procrastination ($\gamma_{11}=-0.458$; 95% CI, –0.735 to –0.180; $P<0.001$) over 12 months, but no significant differences were found for other secondary outcomes

Table 1 (continued)

Authors (year) country	Sample and setting	Intervention (aim and conceptualization)	Complementary interventions	Underlying theory	Measurements and diagnostic criteria for GD	Results/outcome
3. Szasz-Janocha, Vonderlin, and Lindenberg (2020) Germany [24•]	$N = 54$ patients (16.7% female) No control group 9–19 years ($M = 13.48$, SD = 1.72), received the CBT group program Self-selected sample reporting excessive gaming or Internet use 11 intervention groups of 3–7 participants in an outpatient addiction counseling center	A. The PROTECT + intervention aims for the controlled use of gaming activities B. PROTECT + is a cognitive behavioral therapy (CBT)–based group intervention. Consists of four 100-min sessions that include psychoeducation, cognitive restructuring, and life skills	None mentioned	CBT	0-, 1-, 4-, and 12-month follow-up Compulsive Internet Use Scale Video Game Dependency Scale Self-Report Video Game Dependency Scale Parental Report 12-month follow-up semi-structured clinical interview Secondary endpoint measures (0, 1, 4, and 12 months) Hours spent gaming: Strengths and Difficulties Questionnaire Self-Report Strengths and Difficulties Questionnaire Parental Report The German version of the Children's Depression Inventory Social Interaction Anxiety Scale German revision of the Fear Survey Schedule for Children Revised German Questionnaire for Procrastination German Questionnaire for Assessment of Emotion Regulation in Children and Adolescents German Student Assessment List for Social and Learning Behavior German General Self-Efficacy Scale	Significant reduction in both self-reported and parental-reported symptom severity after 12 months with medium to large effects No effect on post-intervention and 4-month follow-up Secondary outcome variables showed a significant reduction in self-reported depression, social anxiety, performance anxiety, and school anxiety, as well as in parental-reported general psychopathology
4. Pornnoppadol et al. (2020) Thailand [22]	$N = 104$ $n = 30$ in control group $N = 50$ adolescents in S-TRC ($n = 24$ only S-TRC; $n = 26$ S-TRC + PMT-G) $n = 24$ parents receiving PMT-G Adolescents 13–17 years old Residential treatment setting	A. The goals of Siriraj Therapeutic Residential Camp (S-TRC) are to foster the balance of life and gaming and to promote healthy gaming behavior B. Included: - 7-day and 6-night stay - 10 sessions of group CBT conducted by clinical psychologists - 4 sessions of a media literacy course - 2 workshops on the balanced use of computer skills - Sports, outdoor activities, walk rallies, trekking, group activities, and family activities	1. 8-week Parent Management Training for Game Addiction (PMT-G): 8 sessions (3 h), including: • Lectures, group activities, role playing, and home practice assignments Focus on understanding GD and parenting skills 2. Basic psychoeducation for parents Multi-arm study approach, S-TRC combined with PMT-G or basic psychoeducation, and only PMT-G without S-TRC	CBT	Parental report on baseline, 1-month, 3-month, and 6-month follow-up. The online questionnaires included questions about demographics and 4 measurements: • 16 items that assess 3 domains of problematic gaming behaviors (preoccupation with gaming, loss of control, and functional impairment) over the previous 3 months • Quality of Life Scale • Game Addiction Protection Scale • Pediatric Symptom Checklist-17	All groups showed improvement over the control group. The percentage of adolescents who remained in the addicted or probably addicted groups was less than 50% in the S-TRC, PMT-G, and combined groups. Both S-TRC and PMT-G were effective psychosocial interventions for Internet gaming disorder (IGD) and were superior to basic psychoeducation alone. The effects of the interventions were maintained for at least 6 months of follow-up The combination of S-TRC and PMT-G may have some benefit in alleviating overall behavioral problems, which are not limited to gaming behaviors

Table 1 (continued)

Authors (year) country	Sample and setting	Intervention (aim and conceptualization)	Complementary interventions	Underlying theory	Measurements and diagnostic criteria for GD	Results/outcome
5. Zamanian et al. (2020) Iran [46]	$N=64$ students $n=32$: intervention $n=32$ control group Mean age 13.8 ± 0.9 years Exhibiting computer game dependency	A. To reduce the level of dependence on computer games B. Educational program based on Theory of Planned Behavior (TPB) had seven 90-min training sessions, which included the following topics: - Own knowledge and attitude toward computer games and their impact on health - Self-awareness - Effective communication skills - Anger control skills - Introducing alternatives to computer games	A workshop on parental supervision and monitoring, introducing alternative methods	TPB: reasoned action is a function of attitude and beliefs toward behavior change	1. Game Addiction Scale [47] 21 items, pre-DSM 5, 7 factors 2. Questionnaire based on TPB with 3 sections: a. Demographic questions (23 items) b. Knowledge questions (13 items) c. Questions about the TPB constructs (37 items)	A significant reduction in the score of computer game dependency in the intervention group. In other words, the designed educational intervention in this study reduced the mean score of dependency in the intervention group The findings of the current survey showed a significant change in the knowledge and attitude scores in the intervention group immediately and 3 months after the intervention
6. Kochuchakkalackal Kuriala and Reyes (2020) Philippines [48]	$N=40$ adolescents 16–19 years old No control group "Gamers" studying in the Philippines	A. To reduce the symptoms of IGD and improve the psychological well-being of adolescent gamers B. ACRIP consists of 10×3-h sessions integrating CBT and mindfulness training focused on: - Self-awareness - Self-acceptance - Identifying and modifying cognitive distortions	None mentioned	CBT (acceptance and cognitive restructuring) and Mindfulness	Pre- and post-intervention measurement with: 1. The Internet Gaming Disorder Scale 9 – Short Form [49] measures severity and its detrimental effects by examining gaming activities occurring over 12 months 2. Ryff's psychological well-being scale consists of 84 items dealing with how individuals feel about themselves and their lives. Six dimensions: (a) autonomy, (b) environmental mastery, (c) personal growth, (d) positive relations with others, (e) purpose in life, and (f) self-acceptance 3. Demographic information form	Post-test results showed significantly lower IGD and higher psychological well-being mean scores, suggesting that the ACRIP is consistent and effective as an intervention program
7. Sakuma et al. (2017) Japan [23]	$N=10$ patients with IGD, all male, mean age = 16.2 years Diagnosed with the DSM-5 No control group In a national central children's center	A. To reduce time spent gaming and increase self-efficacy; to foster awareness of health, wellness, and a well-regulated life; to experience communication without the Internet or digital devices; and to collaborate with others and solve problems B. Included an 8-night and a 9-day stay - 14 sessions of CBT - 3 medical lectures - 1 workshop - Outdoor cooking, a walk rally, trekking, and woodworking	8 sessions of personal counseling during the camp	CBT Based on the TRC program in South Korea [35], which involves 11 nights and 12 days of camp-style residence and intervention	Pre-, post-intervention, and 3-month follow-up 1. IGD semi-structured interview according to DSM-5 criteria and Griffith's 6 components of addiction: salience, mood modification, tolerance, withdrawal, conflict, and relapse [50] 2. SOCRATES (self-efficacy, pre- and post-intervention) 3. Time spent gaming (pre- and 3-month follow-up)	1. The median hours of gaming time per day decreased (-3.18) 2. The median hours of gaming per week also decreased (-27.04) 3. However, the gaming time in days per week remained consistent 4. No change in recognition and ambivalence subscales was found 5. There was an improvement in the "taking steps" subscale of SOCRATES

Table 1 (continued)

Authors (year) country	Sample and setting	Intervention (aim and conceptualization)	Complementary interventions	Underlying theory	Measurements and diagnostic criteria for GD	Results/outcome
8. Ji and Wong (2023) China [51]	*N* = 77 Wait-list control group *n* = 39 Experimental group *n* = 38 Age 15–18 years Gender 88.3% male Setting: vocational school	To reduce GD symptoms and facilitate motivation in adolescents with GD to identify their interests and strengths and to set goals for developing personally meaningful offline activities A. 8 weekly treatment sessions (1.5 h) in groups of 6–7 participants Content included: • Understanding gaming patterns • Understanding maladaptive gaming-related cognitions and developing strategies for cognitive modification • Identifying strengths and interests, setting goals, and planning leisure time • Reviewing and consolidating lessons	None mentioned	ICBT (integrated cognitive-behavioral therapy) with a strength-based motivational approach. to enhance motivation in adolescents and youth with GD	Pre-treatment (t0), post-treatment (t1), 3-month (t2) and 6-month (t3) follow-ups -Gaming disorder: a. Chen Internet Addiction Scale—gaming version (CIAS-G) [52] Secondary outcomes Gaming time: self-estimated seven-point question of hours each week spent on gaming - gaming motivation The escapism and achievement subscales of the Online Game Psychological Needs Questionnaire (OGPNQ) - The Chinese version of the: Revised Internet Gaming Cognition Scale (C-RIGCS) b. Nine-item Patient Health Questionnaire (PHQ-9) c. Seven-item Generalized Anxiety Disorder (GAD-7) scale	The ICBT intervention significantly reduced GD symptoms and time spent on gaming with large effect sizes and reduced depression and anxiety symptoms with medium effect sizes The treatment effect lasted from post-treatment to 6 month follow-up The ICBT intervention reduces GD by decreasing gaming motivation and maladaptive gaming cognition

The terms used in the table are those used in the respective studies. For example, in our work, we systematically refer to gaming disorder or problematic gaming, but some studies used terms such as "gaming addiction"

difference between the experimental and control groups regarding the incidence rate (six participants in each group developed GD in the 12-month follow-up period).

For study 3 [24•], PROTECT + targeted a sample of 54 participants who sought treatment for "excessive gaming" or Internet use, leading to a significant reduction in self-reported and parent-reported symptom severity after 12 months. The beneficial effect was found to be larger in more impaired individuals according to exploratory growth models. No significant change was observed at the 4-month follow-up measurement. According to the semi-structured retrospective interviews at 12-month follow-up, 38.9% ($n = 14$) of the participants decreased in severity from "high-risk" or "pathological game users" to "unproblematic users."

In study 4 [22], parental appraisal of PG severity showed enduring (6 + months) improvement in all groups (group treatment, parental group treatment, and a combined approach), when compared with that for the wait-list control group who received a 1-h psychoeducation course. There was no significant difference in the effect size between the Parent Management Training for Game Addiction (PMT-G) and partaking in the Siriraj Therapeutic Residential Camp (S-TRC). The PMT-G emerged as the preferred option for treatment.

Study 5 [46] showed a higher mean reduction in pre- and post-intervention "game dependency" scores in the intervention group (educational intervention) when compared with that in the control group. This effect was not observed at the 3-month follow-up. The study also lends support to the Theory of Planned Behavior, which focuses on "knowledge, attitude and perceived behavioral control and behavioral intention" [48 p. 186] as important factors for behavioral change through an educational program.

As part of study 6 [48], the pre- and post-tests in the Acceptance and Cognitive Restructuring Intervention Program experimental group ($N = 20$) showed a significant decrease in levels of "Internet gaming disorder" and a rise in psychological well-being compared with that in the control group ($N = 20$).

In study 7 [23], a significant decrease in the median hours of gaming per day and per week was reported at the 3-month follow-up after a "Self-Discovery Camp." In the post-intervention measurement of treatment readiness, a significant change was found only in the factor "taking steps," pertaining to self-efficacy.

Lastly, in study 8 [51], by decreasing gaming motivation and maladaptive gaming cognitions, the ICBT intervention significantly reduced GD symptoms, time spent on gaming, and depression and anxiety symptoms. The treatment effect was maintained for 6 months.

Quality Assessment

Table 2 presents a summary of the QuADS [42] evaluation of the eight included studies. Given the small pool of eligible studies, we included non-randomized controlled trials, which precluded the use of the CONSORT criteria. Therefore, the QuADS were more suitable to assess and compare the quality of the selected studies with different methodologies. This tool, however, is not intended to distinguish between high- and low-quality studies [42]. The QuADS comprises a 13-item checklist scored on a 4-point scale that follows a scoring guide. The evaluation was performed by two authors (H.B. and D.L.S.). There was considerable variation in the quality of the included studies.

Two studies from the PROTECT group [24•, 44] stood out for their quality. A shortcoming found in the quality appraisal was, however, that both studies made only a general reference to broad theories that framed the interventions (CBT), rather than specifying how it was operationalized.

Impact on Motivation

Studies rarely reported on building motivation for change, even when participants were identified as being poorly motivated to participate in the intervention [22, 24•]. In the case of the most recent study [51], however, there was a focus on the interaction between cognition and motivation for gaming leading to a shift in time used to fulfill psychological needs.

Parental Guidance

Certain of the studied interventions targeted only adolescent gamers [23, 24•, 44, 48]. Study 1 [43] included family therapy with psychoeducation activities for parents, as well as a six-session group meeting on social and communicative training for adolescents and their parents. Study 4 [22] introduced a group intervention and an 8-week parental management training group, which were both studied in a standalone and combined format. In study 5 [46], a workshop on parents' supervisory role was conducted, aiming for a higher level of parental monitoring of children's gaming behavior.

Experiential Learning

Five studies focused on cognitive restructuring and did not mention the effect of experiential learning as a specific aspect of the group treatment [24•, 43, 44, 46, 48, 51]. The studies on residential interventions (both TRCs) facilitated experiential learning: workshops in which computer skills were introduced to be used more productively [22, 23], outdoor activities [22, 23], and family activities [22].

Discussion

The purpose of this systematic review was to synthesize the available evidence on GBIs for adolescents with GD/PG. Eight articles from Europe and Asia were retained.

Table 2 Study assessments and total scores of the Quality Assessment with Diverse Studies (QuADS) tool

Authors, year	Program name	Scores for each item (0–3)													Total score
		1 Theory	2 Research aims	3 Study setting and targets described	4 Appropriate study design	5 Appropriate sampling for aims	6 Rationale of data collection tools	7 Format and content of data collection appropriate	8 Data collection procedure described	9 Recruitment described	10 Data analysis method justified	11 Suitable data analysis	12 Considered research stakeholders	13 Strengths/limitations discussed critically	/39
1. Asieieva et al., 2022 [43]	GPSA	2	2	2	1	0	1	2	1	0	0	1	0	0	12
2. Lindenberg et al., 2022 [44]	PROTECT	3	3	3	3	3	3	3	3	3	3	3	3	3	39
3. Szasz-Janocha et al., 2020 [24•]	PROTECT +	3	3	3	3	2	3	3	3	3	2	2	2	3	35
4. Pornnoppadol et al., 2020 [22]	S-TRC	2	3	3	1	3	2	1	2	3	3	3	0	3	29
5. Zamanian et al., 2020 [46]	Educational Program TBP	2	2	1	2	1	1	1	0	0	1	2	0	1	14
6. Kochuchakkalackal Kuriala et al., 2020 [48]	ACRIP	2	1	2	1	1	2	1	2	2	2	2	3	1	22
7. Sakuma et al., 2017 [23]	SDiC	2	1	3	1	1	1	1	2	2	2	3	0	3	22
8. Ji and Wong, 2023 [51]	ICBT	2	3	2	3	3	2	3	1	1	2	3	0	3	25

Studies primarily sought to reduce the impact of gaming on everyday life and help participants regain control over gaming behavior. In half of the studies, group sessions were only part of a larger treatment plan. All interventions studied focused on cognitive restructuring via CBT-based group approaches in different forms (e.g., psychoeducation, sharing and confronting beliefs, emotional regulation training, and planning leisure time). Only two studies implemented experiential learning [22, 23]. Regarding symptoms of GD, all studies reported decreases to varying degrees.

Collectively, the studies suggest that CBT-focused groups are the preferred orientation of clinicians and researchers in this area. However, the use of the group approach per se was never the primary focus of the studies, nor was there any reflection on group dynamics or the effects of the group on gaming behavior. Frameworks such as the Mechanisms of Action in Group-based Interventions (MAGI [54]) have emerged to address this need, describing six clusters of interacting factors: "(1) group intervention design features, (2) facilitation techniques, (3) group dynamic and development processes, (4) inter-personal change processes, (5) selective intra-personal change processes operating in groups, and (6) contextual influences" [56 p. 227]. The framework is intended to enhance the design and delivery of GBIs, as well as to direct further research, training, and evaluation thereof. The role of peer support in recovery was also not addressed in the interventions. From the self-help literature, it has been shown that engagement in group meetings fosters continuous abstinence and leads to recovery-supportive benefits (e.g., connectedness and acceptance) [55–57].

We observed that, consistent with earlier research on treatments for gaming-related issues among adults and adolescents [10, 11, 18, 58], our sample of studies lacks sufficient methodological robustness. In addition, as highlighted in Zajac and colleagues' review [18], all of our included studies must be considered pilot studies, as they do not meet the criteria for well-established or probably efficacious treatment [59]. Methodological issues thus make it difficult to infer the role of the group approach in the results. That notwithstanding, CBT remains the most widely examined approach for adolescent groups. Given the call for innovative and complementary interventions by Stevens et al. [10], it is important to further develop and test new approaches to prevent and/or reduce PG/GD.

Clinical Relevance of the Findings

There is a growing need for research on PG/GD among adolescents and the use of GBIs. However, the study of adolescent GBIs might be more challenging than research on adult populations and/or individual interventions because of (1) the dynamics involved in the age group and the developmental stage of participants and (2) the additional practical challenges to group interventions in research trials [17•, 60, 61]. It is a challenging task to convene homogenous groups (e.g., in terms of severity of the disorder and motivation for change) of suitable size, which may impede the continuity of interventions and lead to dropout [17•, 49, 61]. In addition, to tease out group-induced effects, multiple other factors that may be implicated in intervention outcomes must be considered [62]. We echo Liddle's [62] view that researchers are called upon to be "clinically creative." Possible strategies include the use of post-session questionnaires [63] and in-depth interviews [14], as well as participatory observation [64], to help establish what actions in the group appear to have a positive or negative impact on the therapeutic process.

Dedicating more funding to this area of study may (1) further promote more methodologically robust research, (2) support participant recruitment and promote retention, and (3) foster clinician-researcher cooperation from the planning and designing of interventions.

Limitations

Our findings should be considered in light of some limitations. First, including only English-language studies restricted the scope of the review and excluded the proliferation of gaming-related studies published in German, Chinese, Japanese, and Korean [11]. Second, the exclusion of studies on "Internet addiction" may also have narrowed the scope of interventions that targeted gaming indirectly, as well as potentially relevant GBIs. As several studies were not restricted to GD, it is a limitation that outcomes could not exclusively be reported for GD. However, excluding these studies would have resulted in the loss of valuable information given the low number of studies overall. Third, the fact that studies varied in their operationalization of groups (size, composition, and setting) and intervention intensity (e.g., program duration and number of sessions) affected direct comparison. Fourth, although the QuADS is beneficial for assessing the quality of mixed methods studies, it emphasizes selected aspects of studies, remains descriptive, and focuses on replicability.

Suggestions for Further Research

We recommend that future research integrate observation and in-depth interviews when evaluating the outcomes of interventions on GD/PG. Over and above its utility as a design tool, the MAGI framework [54] could potentially guide the quality assessment of intervention protocols and studies. Furthermore, there is a need for research into how the natural psychological development of adolescents can

be accounted for when examining the long- and short-term effects of treatment.

Conclusion

The value of GBIs did not come to the fore in the existing literature, and the power of "the group" and how it could be leveraged for the benefit of adolescents remained largely unaddressed. We are still in the early stages of treating persons with PG/GD, and the evidence base for GBIs is currently limited. CBT has been the framework of choice for GBIs for adolescents, and, although results are positive, studies are still in the pilot phase. In one study, parental training yielded similar results to those of the GBI for gamers, which suggests that working with parents to manage adolescent gamers could be more time and resource-efficient. Future studies should aim for innovative designs, where cooperation between researchers and clinicians is central to developing protocols for treatment and research that explicitly target adolescents and their families, and seek to overcome recurrent study limitations.

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Declarations

The Section Editors for the topical collection Internet Use Disorders are Hans-Jürgen Rumpf and Joël Billieux. Please note that Section Editor Joël Billieux was not involved in the editorial process of this article as he is a co-author.

Competing interests The last author of this article, Prof. Joël Billieux, serves as an editorial board member and a topical editor for Current Addiction Reports. However, he was not involved at any stage of the review process. The other authors declare that they have no conflict of interest.

Conflict of Interest The last author of this article, Prof. Joël Billieux, serves as an editorial board member and a topical editor for *Current Addiction Reports*. However, he was not involved at any stage of the review process. The other authors declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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