

# Internet Addiction in Children: A Narrative Review

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## Abstract

**Method:** This narrative review summarizes research from the years 2019-2024 on internet addiction in children.

**Results:** This recent research suggests a prevalence rate ranging from 18% to 59% in India and a narrower range from 19 to 23% in Korea, suggesting variance within and across cultures. Negative effects/correlates include emotional (unhappiness, anxiety), cognitive (inattention, lower academic achievement), behavior (inactivity, disruptive behavior), and physical problems (sleep disturbances, migraine headaches). Risk factors have included parent variables including permissive parenting and parent smartphone use and child variables including inactivity and ADHD. Only one paper was found on potential underlying biological mechanisms which suggested a genetic predisposition. Only a few papers on buffers/interventions appeared in this literature suggesting the effectiveness of green space and exercise as buffers and cognitive behavioral therapy and electroacupuncture as interventions.

**Discussion:** The studies in this review highlight the prevalence and severity of internet addiction in children. However, they are limited by being primarily based on mixed-age child and adolescent samples as well as results that are confounded by the negative correlates/effects of internet addiction in children.

**Keywords:** internet addiction; excessive screen time; children and adolescents

## Introduction

This narrative review summarizes 46 papers on internet addiction in children and adolescents that were derived from a search on PubMed and PsycINFO using the terms internet addiction in children and the years 2019–2024. Other terms have been used for this addiction including media addiction, excessive screen time and problematic screen time. Although the term “children” was entered into this literature search, several of the research samples have included both children and adolescents. Exclusion criteria for this review included papers on proposed protocols, case studies and non-English language papers. The publications can be categorized as prevalence data, negative effects/correlates, risk factors, potential underlying biological mechanisms and interventions. This review is accordingly divided into sections that correspond to those categories. Although some papers can be grouped in more than one category, 12 papers included prevalence data, 27 were focused on negative effects, 7 were focused on risk factors, 1 on potential underlying biological mechanisms and 3 on buffers/interventions.

## Prevalence of Internet Addiction and Excessive Screen Time

In this literature, different research groups have referred to the use of internet/screen time greater than two hours per day as internet addiction or excessive screen time. Internet/ screen devices are increasingly available and at younger ages. For example, in a study from Turkey on children less than five years old, 97% owned a mobile phone, 54% a laptop, and 34% a gaming console (Mutly et al, 2024). Surprisingly, as many as 66% of their parents did not know the concept of screen time. In a study from the Netherlands (N= 888), screen time averaged 51 minutes per day for 3- to 4-year-old children and 122 minutes per day for 10 to 11-year-old children (Cangchao et al, 2023). In contrast, outdoor play only occurred 77 to 81 minutes per day. In a meta-analysis entitled “Prevalence of meeting 24-hour guidelines from preschool to adolescence: a systematic review and meta-analysis” 387,437 youth (3-to-18 -years-old) from 23 countries participated (Tapia-Serrano et al, 2022). The 24-hour movement guidelines originally developed by Canadian researchers include: 1) more than 60 minutes of moderate -to-vigorous physical activity per day; 2) less than two hours recreation screen time; and 3) 9 to 11 hours sleep for 6-to-13-year-old youth and 8 to 10 hours for those 14 to 17-years-old (Chen et al, 2022).

In the meta-analysis from 23 countries (Africa, Asia, Europe, North America, Oceania, and South

America), only 7% met all three of the guidelines and as many as 19% met none of them (Tapia - Serrano et al, 2022). At the preschool stage, 11% met the guidelines, at the grade school age, 10% met the guidelines, but only 3% met the guidelines during adolescence. Those who did not meet the guidelines included 8% of the preschoolers, 16% of the grade school youth and 29% of the adolescents. Less adherence occurred in South America and in low-income countries and less adherence occurred in

adolescent females. The prevalence of internet addiction in children, also referred to as media addiction, excessive screen time and problematic screen time, has varied widely across cultures and even within countries (see table 1). For example, in India the prevalence rates have ranged from 18% (Jain et al, 2023) to 38% (Raju et al, 2023) to 58 % (Pasi et al, 2023). The two extreme rates may be explained by age differences as the sample with the highest rate was comprised of older children.

**Table 1:** Prevalence of internet disorder in children (and first authors).

Prevalence	First authors
India, 18% of children 3-to-15 years-old	Jain
India, 38% children 8-18-years-old	Raju
India, 58% children 5-12-years-old	Pasi
India, 73%, children less than 5 years-old	Varadarajan
Korea, 23% children 8-9-years-old	Bae
Korea, 19% children 10-years-old	Lee
China, 56% children 2.5 years-old, 35% children 4 years-old	Liu

Variability across the samples from India may not only relate to age differences but also to their varying criteria for addiction and the variety of risk factors. The research group reporting 18% internet addiction on 3 -to -15 -year-old youth defined it as greater than two hours per day of internet use (Jain et al, 2023). The risk factors within this sample were highly variable including age, mobile phone use before bedtime, parents' perception of the children's habituation to screen time, TV in the bedroom, morning screen time, not reading books, and lacking outdoor play. The only buffer was eye pain. For the sample from North India (N= 212) that had a 38% prevalence rate, the criterion for internet addiction was greater than three hours per day (Raju et al, 2023). This sample included 8 to 18-year-old youth. The greater prevalence in this sample (38% versus 18% in the previous sample) may relate to the youth being older 8-18 years-old versus 3-to-15 years-old. The risk factors in this sample were being male, gaming, and neurodevelopmental and disruptive disorders. The sample with the highest rate in India (58%) surprisingly included a wide range of very young 1-to-12-year-old youth, although the high prevalence only pertained to the 5-12-year-old children (N=278) (Pasi et al, 2023). The criterion for internet addiction in this sample was greater than four hours per day. This sample also had vision, behavior and sleep problems that were correlated with screen time and this study involved a sample of youth who were experiencing a

COVID-19 pandemic lockdown, all factors that would be expected to compound and confound the negative effects of internet use.

The media/ internet addiction rates were lower in Korea. The rate of media addiction was 23% In a sample of 8 and 9-year-old children (N=1078) (Bae et al, 2023). The significant risk factors were permissive parenting, media use time, being male and time spent without parents. The rate was lower at 19% in a sample of 10-year-old children (N=1224) who were referred to as internet addicted (Lee et al, 2023). The same risk factors were noted for this Korean sample including more permissive parenting, being male and spending more than one hour per day without parents. An extremely high rate of 59% was reported for a sample of 10-15-year-old youth who were spending on average 7 hours per day on social media (N=339) (Limtrakul et al, 2019). The risk factors noted for this sample were more problems with prosocial behavior at school and sleep disturbances. In contrast, a surprisingly low rate of 4-9% was noted for Turkish youth with headaches (9% in a sample of 103 youth with migraine headaches and 4% in a sample of 97 youth with tension-type headaches) (Boyukbas et al, 2019). It is not clear whether their headaches derived from screen time or their headaches discouraged excessive screen time. Surprisingly high rates of excessive screen time have been noted in a few samples of very young children. For example, excessive screen time (more than two

hours per day) occurred in 73% of children less than five years-old in a sample (N=718) from rural and urban areas in India (Varadarajan et al, 2021). These data were based on mothers' observations across seven days. No differences were noted between the children in the rural and urban areas, although greater internet addiction has been noted in children from rural areas in at least one study (Nigg et al, 2022). In this sample (N= 12,161 4- to 17- year-old youth from Germany), greater screen time was noted in rural areas along with less physical activity, especially in female adolescents.

In another young sample (N=2492) in a longitudinal study from China, excessive screen time (greater than 2 hours per day) was noted in 56% of children at 2.5 years-old and 35% of children at 4 years of age (Liu et al, 2021). These high prevalence rates in very young children are difficult to interpret as they seem to be representative samples, although negative effects/correlates were noted in each of the samples.

## Negative Effects/Correlates of Internet Addiction in Children

Several studies have referred to internet addiction/excessive screen time as greater than two hours of use per day. Although negative effects are their outcome variables of interest, the negative effects could also be considered correlates since most of the studies are cross-sectional, making direction of effects impossible to determine. The negative effects/correlates that have appeared in this literature on internet addiction in children and adolescents include emotional (unhappiness, anxiety), cognitive (inattention, low academic achievement), behavior (inactivity, disruptive behavior), and physical problems (sleep disturbances, migraine headaches) (see table 2). These negative effects/ correlates have been the focus of separate studies and have also appeared in clusters of negative effects/correlates in some papers.

**Table 2:** Negative effects of internet disorder in children (and first authors).

Negative Effects		First Authors
	Emotional	
unhappiness		Twigg
anxiety		Luengo-Gonzalez
	Cognitive	
Inattentiveness		Santos, Matsui
Less cognitive proficiency and lower IQ		Zhao
Lower academic achievement		Matsui
	Behavioral	
Behavior		Ueno, Kim, Pasi
Conduct disorder, oppositional defiant disorder		Nagata
Inactivity		Chen
Hyperactivity		Wu
Sleep problems		Pasi
		Nishioka, Hisler, Guerrero,

### Negative Emotional Effects/Correlates

The negative emotional effects that have been addressed in this literature include unhappiness and anxiety. In results from the UK Household Longitudinal Study, girls who were spending more time on social media were significantly **less happy** (Twigg et al, 2020). In a study on the relationship between problematic technology use and **anxiety** (N=4025), problematic use, not surprisingly, was related to greater anxiety (Luengo-Gonzalez et al, 2023). Direction of effects cannot be determined based on these cross-sectional data. Anxiety is as likely to contribute to problematic use as problematic use is to lead to anxiety.

### Negative Cognitive Effects/Correlates

The negative cognitive effects that have appeared in this literature on internet addiction in children include inattention and poor school performance. In a longitudinal study on very young Chinese children (N=152 from 6 months to 6 years), a trajectory was followed on technology use and cognitive proficiency as well as scores on the Strengths and Difficulties Questionnaire and the Wechsler Intelligence Scale for Children (Zhao et al, 2022). Low use was noted in 72% of the sample. Early increasing use was noted at 1.5 years of age in 16% of the sample and late increasing use was noted at 3 years of age in 11% of the sample. The early increasing group had **lower cognitive proficiency, lower IQ scores** and higher difficulties scores.

A relationship between screen time and **academic achievement** has been reported for older Japanese youth (N=113 9-12-year-old children) (Matsui et al, 2024). This relationship was mediated by chronotype (morning Ness/ evening Ness scores) and emotional behavior problems. The relative significance of these mediators was not clear in this paper.

**Inattentiveness** is another negative cognitive effect that may derive from excessive screen time and sleep problems noted in the previous study and it may have contributed to the low academic achievement also noted in the previous study (Matsui et al, 2024). In a systematic review of 41 studies, excessive screen time and attention problems were significantly related in children (Santos et al, 2022).

### Negative Behavior Problems/Correlates

Behavior problems were frequently noted negative effects/correlates of internet addiction in children in this recent literature. The types of behavior problems were typically not specified but simply indicated by scores on behavior questionnaires except for one study that specified disruptive behavior disorders including conduct disorder and oppositional defiant disorder. A few of the studies were conducted during COVID-19 lockdowns which likely exacerbated the behavior problems associated with excessive screen time. Behavior problems have been notably greater during lockdowns not only because of school closure peer-related separations but because of confinement with parents who are then more aware of children's behaviors and would more readily report them on surveys.

In a study entitled "The relationship between behavioral problems and screen time in children during COVID-19 school closures in Japan", children from four public elementary schools (N=959) were included in the sample (Ueno et al, 2022). Fifty per cent of the **behavior problems** that occurred during school closure were associated with excessive screen time and 17% of bodyweight gain was associated with excessive screen time and behavior problems.

In another study that was conducted during a COVID-19 lockdown but in South Korea (N=186 children, mean age=10 years-old), the mean screen time was 3.5 hours/day (Kim et al, 2023). The time and frequency of screen time was correlated with not only the children's behavior problems but also with parental stress.

Still another study on excessive screen time was conducted during a COVID-19 lockdown in South India (N= 278 one-to-12-year-old children) (Pasi et al,

2023). In this sample, as many as 58% of children between the ages of 5 and 12 averaged more than 4 hours per day on screen time. The children's behavior problems were correlated with screen time.

In research on more severe behavior problems, namely disruptive behavior disorder, data from the ABCD longitudinal study were analyzed (N=11,8759 children 9 and 10-year-old) (Nagata et al, 2023). These analyses suggested that the children averaged 4 hours per day on screen time modalities. At the one-year follow-up assessment, those children who had averaged more than 4 hours per day of screen time had more symptoms of **conduct disorder** (69%) and **oppositional defiant disorder** (46%).

### Inactivity and Hyperactivity

Inactivity and hyperactivity are also problems for children with Internet addiction. In a study entitled "Associations between early-life screen-viewing and 24-hour movement behavior: findings from a longitudinal birth cohort study", parents reported on their children's screen time at two years and accelerometers were used for seven days at five years in a sample of 20 children from the Growing Up in Singapore Study (N = 52) (Chen et al, 2020). More than three hours of screen time at two years predicted more sedentary behavior, **less light activity**, and less moderate/ vigorous activity at five years.

In contrast, hyperactivity has also been associated with excessive screen time in children less than 3-years-old in China (N = 42,841) (Wu et al, 2022). In this sample of children, the mean screen time was 56 minutes per day. Those children who engaged in screen time more than 90 minutes per day were more likely to become hyperactive.

### Sleep Problems

Sleep problems have also resulted from excessive screen time/internet addiction. And sleep problems have also been a mediator for the relationship between excessive screen time and behavior problems. In a paper entitled "Effects of screen viewing time on **sleep duration** and bedtime in children aged one and three years: Japan environment and children's study", more use of portable electronic devices led to shorter sleep duration in a large sample of children (N= 74,525) (Nishioka et al, 2022). Late bedtime at one year, in turn, led to late bedtime at three years.

In a similar study in the U.S., 21 sites were included (the ABCD study on 11,000 children 9-to-10-years-old) (Hisler et al, 2020). Greater screen media use led to shorter sleep duration, a greater sleep onset latency,

excessive sleepiness and **insomnia**. Also, data from the ABCD study (N =11,875 children 9-to-10-years-old) suggested that sleep duration mediated the effects of screen time on problem behaviors including somatic complaints and aggressive behavior (Guerrero et al, 2019).

In the study from South India (N=278 children 1-to-12 years old), 58% of the children between the ages of 5 and 12 averaged more than four hours per day of screen time (Pasi et al, 2023). Screen time was correlated with sleep problems.

### Physical Problems

Several physical problems have been associated with excessive screen time. These include developmental delays, cardiorespiratory problems and migraine headaches.

In a study entitled “Prevalence of excessive screen time and its association with developmental delays in children less than five-years-old: a population-based cross-sectional study in India”, parents provided reports on seven days observation of their children's screen time (Varadarajan et al, 2021). Although these children were less than five-years-old, they averaged as many as 2.39 hours screen time per day. Excessive screen time occurred in as many as 73% of the children. The children's screen time was unsurprisingly correlated with their mother's screen time and their own screen time at bedtime. Greater screen time led to **developmental delays**, especially in the domains of language acquisition and communication.

In another study on very young children (N = 307 children 2-to-five-years-old), a longitudinal association was noted between screen viewing in early life and **abdominal adiposity** (Padmapriya et al, 2021). These findings came from the multiethnic birth cohort study entitled “The growing up in Singapore Study”. Greater time screen viewing at two to three years of age led to greater screen viewing at three to five years of age. In addition, greater screen viewing was associated with superficial and deep subcutaneous adipose tissue volumes in boys but not in girls.

In another longitudinal study, excessive screen time was associated with less cardiorespiratory fitness in Japanese children who averaged 10 years of age (N=175) (Goto et al, 2022). In this sample, more than two hours of screen time led to less **cardiorespiratory fitness**.

**Headaches** have also been notable correlates of excessive screen time. In the Turkish sample headaches were prevalent despite extremely low rates

of excessive screen time (Boyukbas et al, 2019). Only 4% of youth engaged in excessive screen time in a sample of 97 youth with tension-type headaches and only 9% in a sample of 103 youth with migraine headaches.

### Multiple Negative Effects/Correlates

Several researchers have reported multiple negative effects/correlates of excessive screen time with more than half of the papers being systematic reviews of multiple studies. In some of these papers, different negative effects/correlates appear at different ages. For example, in a birth cohort study from China, the Strengths and Difficulties Questionnaire was administered at 6 months, 2.5 years and 4 years (Liu et al, 2021). Excessive screen time at 6 months was a risk factor for **emotional symptoms and hyperactivity** at 4 years. Excessive screen time at 2.5 years was predictive of hyperactivity at 4 years. At 4 years, total difficulties scores were elevated, and several other problems occurred including **conduct problems, peer problems, hyperactivity and prosocial behavior problems**.

In a study on older children (N=328 children 9-11-years-old), accelerometers were used for 7 days (Ferrari et al, 2019). Screen time averaged 234 minutes per day and sedentary time 500 minutes per day. Problems that were associated with excessive screen time included **body mass index, dietary patterns, tv in the bedroom and transportation to school**. Likely these problems were also associated with excessive sedentary time.

In a systematic review of 35 studies on children from birth to 10 years of age, problematic media use (greater than 2 hours per day) was more prevalent in the male children and the older children (Rega et al, 2023). Problematic behaviors occurred along with **sleep problems, depression, and less emotional, intellectual and academic achievement**. The risks for the excessive media use included negative psychological symptoms, dysfunctional parent-child relationships and difficulties in school.

In a paper entitled “Screen media overuse and associated physical, cognitive and emotional/behavioral outcomes in children and adolescents: an integrative review”, screen media overuse was associated with multiple problems (Jiangberg et al, 2022). These included **overweight/obesity, inferior executive function and academic performance and increased internalizing and externalizing problems**. Unlike most researchers

in this literature, these authors realistically suggested that these were bidirectional associations.

In a similar review of 43 articles on excessive screen time and health consequences, almost as many negative effects/correlates were reported as the number of articles (Priftis et al, 2022). These included **obesity, cardiometabolic problems, mental health issues, unhealthy diet, eating disorders, dysfunctional parent-child relationships, sleep problems, inactivity, problematic eyesight, headaches, and negative musculoskeletal development effects.**

In still another review entitled “The use of social media in children and adolescents: A scoping review on the potential risks”, the results from 68 reports were summarized (Bozzola et al, 2022). They included nineteen studies on depression, 15 on diet and 15 on psychological problems. The specific problems the authors listed included **sleep disturbances, addiction, anxiety, sex-related issues, behavior problems, body image, physical inactivity, online grooming, eyesight problems, headache and dental caries.** Although the title of this paper suggests that these are potential risks, they might also be considered negative effects/correlates given that these studies were cross-sectional and the direction of effects could not be determined.

### Risk Factors for Internet Addiction in Children

The prevalence of Internet addiction/excessive screen time even as early as infancy and the many emotional, cognitive, behavioral and physical effects/correlates highlight the need for identifying risk factors. Surprisingly, very little research has focused on risk factors in this recent literature. These studies have identified parent variables as risk factors including parent education, permissive parenting and parents’ use of the smartphone and child variables as risk factors including inactivity and ADHD (see table 3).

**Table 3:** Risk factors for internet addiction in children (and first authors).

Parental risk factors	First authors
Less education and low SES	You
Permissive parenting	Chuen, Lee
Parents’ smartphone addiction	Son
Child risk factors	
Physical inactivity	Chen
ADHD	Takahashi

### Parent Predictor Variables

Sociodemographic factors have been identified as predictors of excessive internet use in 9-year-old children (N=4568) participating in the Generation R Study of the Netherlands (You et al, 2021). In this study, the researchers specified excessive use of instant messaging and social network exposure. The predictor/ risk variables in this sample included lower social position defined as **less educated parents** and **low SES.**

**Permissive parenting** has been noted as a significant risk variable for internet addiction in children in at least two studies. In one paper entitled “Worry and permissive parenting is associated with the development of internet addiction in children” (N= 227 4th and 5th grade students), permissive parenting moderated (increased) the relationship between worrying by the children and internet addiction (Chuen et al, 2020). In the second study entitled “Parental and child factors associated with internet addiction in children” (N= 1224 Korean children 10-years-old), 19 percent of the children were experiencing Internet addiction (Lee et al, 2023). More permissive parenting led to Internet addiction especially in males and in those who spent more than one hour per day without adults.

Not surprisingly, **parents’ smartphone addiction** has been a significant predictor in at least one study in this literature (Son et al, 2021). In this research on Korean children in grades 5 and 8 (N=4656), the parents’ smartphone addiction was considered a model for smartphone addiction in the children.

### Child Predictor Variables

Several of the negative effects/correlates that have already been summarized for Internet addiction in children might also be considered predictor/risk variables. Determining the direction of effects would be difficult in most of the studies in this literature that have been cross-sectional. Those variables that have been considered predictor variables include activity variables, i.e. Inactivity and hyperactivity.

As already mentioned, movement guidelines for children (originally developed by Canadian researchers) include spending more than 60 minutes on moderate to vigorous physical activity per day, spending less than two hours of recreational screen time per day and spending 9-to-11 hours sleeping for 6- to-13 -year-old children. In an assessment of movement guidelines in children, only .9% of a sample were noted to meet those guidelines (Chen et al, 2022). In this sample (N = 3807 youth 10- 17-years-old from 12 different schools), **physical inactivity** not

only led to internet addiction but also to less cardio-respiratory fitness and less muscular strength.

The other extreme of **being hyperactive** has been referred to as a genetic risk associated with excessive screen time (Takahashi et al, 2023). In this study, very young children (24 to 30 months-old) with a genetic risk of ADHD engaged in more screen time. The authors suggested that screen time was not a cause but an early sign of ADHD. In this sample, screen time included smartphone, laptop/ PC, game console, tablet and TV.

### Potential Underlying Biological Mechanisms for Internet Addiction in Children

Surprisingly, unlike literature on other addictions in children, for example gaming addiction in children (Field, 2024), only one paper addressed a potential underlying biological mechanism for internet addiction in children (Zhang et al, 2023). The authors suggested a genetic mechanism for Internet addiction in children. In their paper entitled “Shared genetic risk and the association of screen time with psychiatric problems in children”, the ABCD study at 21 sites was the basis for their hypothesis (Zhang et al, 2023). In this sample of 9- to- 11- year- old children (N= 4263 children with a mean age of 10 years), screen time was associated with attention and internalizing problems. A genetic confounding accounted for most of the association between screen time and attention problems estimated at 43% of the association between screen time and internalizing problems. When **polygenic risk scores and twin based heritability estimates** were used, the genetic confounding fully explained both associations.

### Buffers and Interventions for Internet Addiction in Children

The buffers for Internet addiction in children have included green space and exercise. The interventions have included cognitive behavioral therapy and electroacupuncture (see table 4).

**Table 4:** Buffers and Interventions for internet addiction in children (and first authors).

Buffers	First Authors
Green time	Camerini
Exercise	Kidokora
Interventions	
Cognitive behavioral therapy	Ayub
Electroacupuncture	Ayub

In the study on green time or the availability of green space (N = 844 youth 5 to 19 years-old from Switzerland), screen time was a risk factor for mental health in children and adolescents during the COVID-19 pandemic (Camerini et al, 2022). Green time or the availability of green space, in contrast, was a protective factor. The availability of green space may have contributed to exercise being a buffer for internet addiction and depression. In this study on different types of screen behavior and depression in children and adolescents from Japan (N=23,573 youth 8- to- 15 years-old), more time on social media, online games and videos led to greater depression (Kidokora et al, 2022). Greater time spent exercising reduced depression. In the only paper on intervention in this literature entitled “Treatment modalities for Internet addiction in children and adolescents: a systematic review of randomized controlled trials”, 10 trials were reviewed (Ayub et al, 2023). The most frequent and the most effective interventions included cognitive behavioral therapy and electroacupuncture.

### Methodological Limitations of the Literature

This recent literature on internet addiction in children has several methodological limitations that relate to different definitions/diagnoses, sampling, measures, and methods used by the different researchers. These limitations are highlighted by the rare meta-analyses that could not be conducted due to those differences. Although there are several studies that could be entered into meta-analyses, the studies are limited to samples that include both children and adolescents and they vary in age range and the severity of internet addiction. The definitions and diagnostic criteria for internet addiction have also varied across studies with some researchers sampling children who have symptoms of internet addiction and others who have limited their samples to youth who have received a diagnosis of internet addiction. And the criterion for internet addiction has typically been spending more than 2 hours per day on screen time, although excessive screen time has varied from more than 2 hours to more than 4 hours per day to sometimes 7 hours per day. These different levels of excessive screen time have not been compared and their long-term effects have not been assessed in longitudinal studies. And, in several studies, internet addiction has been confounded by problems that are correlated with internet addiction including inactivity and sleep problems and/or comorbid disorders including depression, ADHD and disruptive behavior disorders. Given that most of the research has been cross-sectional as opposed to longitudinal, directionality

could not be determined in the studies on risk factors or those on effects which have been arbitrarily labeled risk factors or effects. And researchers have not traced the longitudinal development of internet addiction. That the samples have typically been a combination of children and adolescents is problematic given that the symptoms and comorbidities that are unique to the children versus the adolescents could not be determined. Some of the studies on symptoms have also lacked comparison groups of children without internet addiction and the very few intervention studies were typically not randomized controlled trials with waitlist control groups. Typically, the studies focused on an individual risk factor, for example, parental permissiveness. When multiple risk factors were reported, for example, parental and child risk factors, the relative contributions of these to the severity of internet addiction were not assessed by regression analyses. The absence of research on peer influences and their effects on internet addiction in this literature was also surprising given the frequency of these effects on other disorders in children and adolescents. That there was only one paper on the effectiveness of cognitive behavioral therapy (CBT) and electroacupuncture, although it was a review of 10 studies, was surprising given that multiple papers have appeared on interventions for many other disorders in children. Also surprisingly, other alternative therapies that have been effective for reducing other childhood disorders like massage therapy (Field, 2024), tai chi (Field, 2023), yoga (Field, 2023) and exercise (Field, 2023) have not appeared in this literature.

A genetic predisposition was the only potential underlying biological mechanism that was suggested in this review of the literature. Although genetics may account for a significant amount of the variance in the risk for internet addiction, other mechanisms that have been described for other addictions did not appear here such as dopamine and reward center activation in the brain. Despite these methodological limitations, this literature has highlighted the prevalence of internet addiction in children and adolescents. The prevalence may have recently increased as the excessive use of social media and the internet has increased. The prevalence of internet addiction in children highlights the need for more intervention research. The studies on risks have helped identify children and adolescents who need therapy and the intervention data have informed clinicians on potential treatments for those with

internet addiction. Further research is needed to specify the relative significance of the internet addiction symptoms for identifying those children and adolescents who need intervention and the specific intervention techniques that are effective in reducing internet addiction.

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