Wiley
New Directions for Child and Adolescent Development
Volume 2025, Article ID 4336597, 20 pages
https://doi.org/10.1155/cad/4336597

WILEY

Research Article

Emerging Impact of Parental Internet Addiction on Adolescent Internet Use: A Cross-Cultural Perspective

A. Yankouskaya,[1] **R. Ali**,[2] **S. AlShakhsi**,[2] **E. Delvecchio**,[3] **N. Manesis**,[4] **C. Mazzeschi**,[3] **S. G. Turan**,[5] **and C. Panourgia**[1]

[1]*Department of Psychology, Bournemouth University, Bournemouth, Dorset, UK*
[2]*College of Science and Engineering, Hamad Bin Khalifa University, Doha, Qatar*
[3]*Department of Philosophy, Social Sciences and Education, University of Perugia, Perugia, Italy*
[4]*Department of Educational Studies and Social Work, University of Patras, Patras, Greece*
[5]*Educational Sciences, Bahcesehir University, Istanbul, Turkey*

Correspondence should be addressed to A. Yankouskaya; ayankouskaya@bournemouth.ac.uk

Received 25 November 2024; Accepted 20 March 2025

Academic Editor: Joana Salifu Yendork

The escalating global concern about internet addiction (IA) in adolescents has driven the necessity to investigate its predictors and their potential effects on youth development. We used a novel methodological approach to facilitate this research and assessed IA in parents and adolescents across five countries—GCC countries, Greece, Italy, Turkey, and the United Kingdom. A total of 1530 participants completed surveys evaluating parental IA, monitoring practices, and adolescent IA symptoms. We found striking evidence that parental IA, adolescent involvement in nonessential online activities, and frequent arguments between parents and children were significant predictors of adolescent IA. Our data suggest similar sociopsychological mechanisms underlying the development of IA in adolescents across various cultural contexts. Contrary to earlier assumptions, parental monitoring of time spent online did not predict IA, suggesting that simply regulating screen time may be insufficient to reduce IA in youth. Instead, tight corresponding symptoms of IA in parent and their adolescents indicate the need for family-centered interventions to mitigate IA risks.

1. Introduction

The prevalence of internet use has been growing steadily. Around 5.4 billion (67% of the world's population) are online. This is a 4.7% increase from a year earlier and illustrates the ongoing rise in global internet usage [1]. The internet is an essential tool for global information exchange. It is also indisputable that our daily lives are profoundly influenced by the internet, which provides the opportunity for entertainment, communication, shopping, work, education, socializing, and making relationships. This phenomenon is particularly evident among adolescents for whom technological proficiency is critical for recreational activities. Recently, however, there has been increasing attention to the negative aspects of internet use, particularly concerning internet dependence among young people.

1.1. Internet Addiction (IA) in Young People. IA, or problematic internet use (PIU), refers to excessive or poorly regulated behaviors associated with internet usage [2–6]. Despite the continuous debate regarding the definition of IA, it is frequently linked to internet addiction disorder (IAD) to highlight the harmful effects of excessive internet usage [7, 8]. A recent meta-analysis including 21,378 individuals from Europe, Asia, America, and Oceania indicates that IAD is an escalating global concern [9]. However, studies differ on the clear-cut difference between IAD and general IA [10]. Therefore, prevalence estimates should be interpreted with caution

because the term "internet addiction" covers a wide range of online behaviors [11].

Some research distinguishes between generalized IA and addiction to specific online activities, such as video gaming, online shopping, and pornography, with slightly overlapping boundaries between them [12]. The most formally recognized form of IA is online gambling, as listed in the *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition* (*DSM-5*). More recently, online video gaming was recognized in the *International Classification of Diseases, 11th Revision* (*ICD-11*), by the World Health Organization (WHO). However, it still has a status of a condition in the latest *DSM* edition.

Science now collected solid evidence that overuse of the internet is associated with severe negative impacts on behaviors (withdrawal to one's room, disordered eating habits, lack of sleep) and psychological functioning (aggressiveness, ostracism, loneliness) resembling those of substance-related addictions [13–15]. Meta-analyses reported effect sizes of these associations ranging between 0.17 and 0.51 ([16]; sss; [17]). A recent meta-analysis suggested that IA is associated with biological changes in the brain areas involved in cognitive control, reward valuation, and motor coordination [18], indicating that the impact of IA on young people is deeper than initially thought. Given the profound impact associated with IA in young people, investigating factors that can predict IA is crucial for developing prevention strategies to mitigate its detrimental effects on young people.

1.2. Understanding Predictors of IA. IA in adolescents is influenced by a complex interplay of individual, familial, and societal factors making it essential to adopt a holistic approach to understanding its development [19]. One such approach is the family ecological perspective [20], which provides a framework focusing on the dynamic relationships between adolescents and their immediate surroundings. In particular, this framework proposes that adolescents are embedded within multiple interconnected systems including microsystem (immediate environment), mesosystem (interactions between microsystems), exosystem (indirect influences), macrosystem (cultural and societal influences), and chronosystem (changes over time).

Many studies supported the validity of the family ecological perspective in understanding the development of IA in adolescents [21]. For example, research suggested that adolescents with higher levels of parental supervision and open communication regarding online activities were less likely to develop PIU [22]. On the other hand, permissive or neglectful parenting led to excessive screen time and, ultimately, IA [23]. Peer influence is another key factor, as adolescents often modeled their internet behaviors after their friends, with peer pressure potentially reinforcing excessive online engagement [24]. There is also evidence that parental attitudes toward digital media shaped adolescent–school interactions, particularly regarding academic performance and online distractions [25]. If parents actively engaged with their children's technology use and established structured screen time rules, adolescents were more likely to balance internet use with other responsibilities. Conversely, if parents are disengaged, excessive internet use interfered with academic achievement and social relationships, creating a cycle that reinforced IA [26]. Cultural differences in parenting styles also affected IA risk. For example, East Asian cultures, which emphasized academic achievement and obedience, tended to enforce stricter digital control, sometimes leading to compensatory internet use [27, 28]. In contrast, Western cultures that promoted autonomy and self-regulation exhibited different patterns of excessive screen time, particularly in social media engagement [29]. In addition, studies showed that parents with demanding jobs or high work-related stress often had limited time for supervision, leading to increased unsupervised screen time and a higher likelihood of IA [30]. Similarly, economic factors played a role in IA in children because financial constraints limited access to structured extracurricular activities, making the internet a primary source of entertainment and socialization for adolescents [31].

These examples above demonstrate that existing research has extensively examined individual systems within the family ecological framework. However, there is a pressing need to explore how factors within these systems interact to better understand adolescent IA. For instance, the relationship between parental IA and parental monitoring is critical, as parents who struggle with excessive internet use may model problematic behaviors, thereby diminishing the effectiveness of their monitoring efforts and increasing the risk of IA in their children. Studies have shown that parental control is associated with adolescent IA, indicating that how parents manage both their own and their children's internet use serves as a key predictor of adolescent digital behavior [32, 33]. Therefore, the extent to which parents monitor, restrict, or discuss online activities with their children may play a crucial role in shaping adolescent IA, as high levels of parental control may either mitigate risky internet behaviors or, conversely, provoke resistance and secrecy in adolescents. Generally, this aligns with findings that adolescents with unmet emotional needs, including those experiencing family conflicts or a lack of parental support, may turn to the internet for escapism, social connection, or validation, increasing their risk of addiction [34]. At the same time, the family environment may reduce the need to resort to using the internet excessively as an escape from stress, depression, and anxiety [35] or to cope with school pressure [36]. However, while parental monitoring remains among the most direct and modifiable factors in shaping adolescent digital habits, the research testing these predictors in one model is limited.

1.3. Parental Monitoring of Internet Use in Children. Parental monitoring of adolescents' time spent on the internet and activities is important in shaping children's online behavior and reducing their risk of IA [22, 37]. The frequency of monitoring varies based on parents' awareness of the risks, technological literacy, and the perceived need for control. For example, parents who are informed about the dangers of excessive internet use tend to monitor children's online activities more closely [38]. As adolescents grow older, parental oversight typically decreases as autonomy increases, with parents expecting more responsible online behavior in their children [39].

What remains inconsistent is whether parental monitoring can reliably predict adolescent IA [33, 40, 41]. Research suggests that active parental involvement, such as checking browsing histories, discussing online safety, and using parental controls—is likely to prevent risky online behaviors [23, 42]. However, these influences are often mediated by cultural context, making it challenging to generalize findings across populations. For instance, in East Asian cultures, where academic achievement and obedience are prioritized, stricter parental control and high expectations are linked to higher levels of IA [43]. In contrast, in Western cultures, where autonomy and self-regulation are valued, a more permissive parenting style might be associated with greater internet use but not necessarily addiction [23, 44].

It has to be noted that certain aspects of parental control appear less influenced by cultural context and may serve as universal predictors of IA. Key practices include monitoring the duration of a child's online activities, supervising the types of activities they engage with, and maintaining awareness of their overall internet use during both school days and weekends [23, 40, 45, 46]. The universal relevance of these practices stems from their core elements of parenting, such as establishing boundaries and encouraging open communication and trust, which are essential across all cultural contexts. However, comparing existing studies across different cultures is challenging due to variations in sampling methods, assessment tools, and the timing of data collection [47]. Addressing these discrepancies is crucial to determine whether parental monitoring of internet use is truly a universal practice that can help prevent excessive internet use.

1.3.1. Time Spent on the Internet. Adolescents' time spent on the internet is increasing rapidly as their engagement in online activities grows. Considering that adolescents use traditional forms of screen media, it is no wonder that adolescents spend more time on media than on sleeping and school combined—an average of more than 7 h daily [48], with some extremes entailing 24/7 online involvement [49]. However, it is still unclear whether online time predicts IA. Several authors reported a positive relation between screen time and addictive internet use [50–52], while others find no association between them [53].

Many colleges and schools use online platforms for learning, assignments, and interaction. Nonetheless, in addition to these educational applications, young people have started to utilize the internet for nonessential activities such as social media, online gaming, and leisure. The distinction between essential and nonessential internet use is vital when evaluating the effects of screen time on children's development and well-being. Although engaging in educational activities is often necessary, excessive nonessential usage might lead to mental health issues or IA (a et al., 2024; [54]). These findings indicate that, on weekends as opposed to school days, adolescents typically allocate more time to online activities because school days involve more structured activities, resulting in limited leisure time. For example, it was found that leisure internet usage escalates on weekends, perhaps contributing to the emergence of problematic internet behavior [4, 55, 56]. Nevertheless, the distinction between essential and nonessential internet use as a predictor of IA among teenagers has frequently been insufficiently examined across cultures. A recent study indicated a positive association between IA and time spent on nonessential online activities with overall fatigue in adolescents. On the other hand, essential internet use was inversely related to mental fatigue [57]. Further, nonessential internet use was found by research, while essential internet use was not to predict IA among adolescents [36, 58].

1.3.2. Activities on the Internet. Recent research suggested that parental monitoring of adolescents' time spent on the internet and activities plays a crucial role in shaping their online behaviors and mitigating potential risks such as IA [22, 33, 59]. Monitoring can help parents ensure their children engage in healthy online habits, balancing their time between screen activities and other essential activities like school, sleep, and physical exercise [60]. The frequency of parental monitoring of internet use among adolescents varies significantly depending on the parents' awareness of the risks, technological literacy, and the perceived need to intervene. Parents who are more aware of the risks associated with excessive internet use tend to monitor their children's online activities more frequently [38]. Moreover, the frequency of monitoring often decreases as adolescents grow older, with parents granting more autonomy and expecting responsible online behaviors [39]. However, research remains inconsistent on whether parental monitoring reliably predicts adolescent IA, with studies presenting contrasting findings on the matter [40, 41].

Research has shown that parents who are more involved in their children's internet activities by checking browsing histories, discussing online safety, and setting up parental controls on children's digital devices can reduce the likelihood of problematic behaviors developing. For example, active parental mediation, which includes monitoring and discussing online content, was associated with lower levels of risky online behaviors among children [23]. Similarly, it was highlighted that parental involvement in monitoring activities, especially with trust and open communication, can mitigate the negative impacts of excessive internet use [22].

1.3.3. Arguments Between Parents and Children as an Indicator of Internet Overuse. Arguments between parents and children are a common aspect of family life, particularly during adolescence, when young people seek greater autonomy. These conflicts often arise as teenagers assert their independence while parents attempt to maintain control and ensure their child's safety. Various psychological and sociological theories offer perspectives on the nature of these disputes, including developmental theory [61], cognitive development theory [62], and social learning theory [63]. While these frameworks differ in their focus, they converge on the idea that parent–child arguments during adolescence function as a negotiation process, with teenagers pushing boundaries and parents striving to provide guidance and discipline [37, 64].

In the context of internet use, frequent conflicts between parents and children can serve as an early indicator of

problematic behavior. Such disputes often reflect deeper concerns about excessive screen time and its associated consequences, including sleep deprivation, declining academic performance, withdrawal from offline social interactions, and irritability when internet access is restricted [45, 65]. For example, escalating arguments may signal a child's growing dependence on the internet for emotional regulation or escape, which, in turn, could indicate a developing IA. Bleakley et al. [40] suggest that these conflicts might even contribute to IA, as children may turn to the internet as a coping mechanism to deal with family stress and tension.

Beyond the frequency of arguments, the nature and intensity of parental control also appear to play a crucial role. Research indicates that overly strict rules, strong disapproval, or excessive parental control can, paradoxically, increase the likelihood of IA rather than mitigating it [66–68]. These findings suggest that the way parents regulate and discuss internet use with their children may be more influential than the mere imposition of rules or restrictions.

Despite the growing body of research on family conflict and IA, most existing studies have been conducted within specific cultural contexts, making direct comparisons challenging. Variations in sample characteristics, assessment tools, and study designs further limit the generalizability of findings. Additionally, there remains a lack of research specifically addressing the impact of frequent, hostile arguments about internet use within families. Given these gaps, this paper is aimed at contributing to the literature by providing further insights into how parent–child conflicts may function as a predictor of adolescent IA.

1.3.4. Parental IA as a Predictor of Children's IA. Children often resemble their parents in terms of appearance, behaviors, and characteristics—a phenomenon supported by several theories in behavioral genetics, psychology, social learning, and epigenetics [63, 69–71]. This observation, widely recognized as a fundamental concept in social and developmental psychology, has been overlooked in human–computer interaction. Specifically, the potential influence of parental IA as a strong predictor of IA in children is often neglected. However, recent evidence suggests that parental internet use significantly impacts children's tendencies toward similar behaviors [32, 66].

It must be noted that the concept of children learning behaviors through the observation of others, particularly influential figures like parents, is well established. For example, social learning theory suggests that individuals often show behaviors acquired either deliberately or unintentionally, shaped by the examples they observe [72]. Since identity development is central during adolescence, young people are especially susceptible to the influence of the adults around them [61]. Therefore, this supports the assumption that if parents frequently use the internet, children will likely adopt similar habits. What remains less understood is whether the pattern of symptoms of IA in children closely mirrors those observed in their parents.

Unlike other behaviors such as smoking and eating, the purpose of using the internet can be concealed, for example, whether it is for work, which introduces a new dimension to mirroring or learning behavior. Research in this area is still in its nascent stage. Still, some studies suggest that the manifestation of IA symptoms can indeed show similarities between parents and children, reflecting shared environment and learned behaviors [32, 73–75]. For example, in places where digital engagement is deeply integrated into daily life, for example, cultural, digital penetration or weather conditions limiting outdoor activities, internet use is high, and the boundary between necessary use and addictive behaviors can become blurred. In such environments, both parents and children are likely to spend considerable time online, which can normalize excessive internet use and increase the risk of developing IA with similar patterns of symptoms. Is this pattern universal across different cultures and locations? Are all the symptoms of IA in parents and children equally mirrored, or do specific symptoms show higher prevalence rates in parents than children and vice versa? Addressing these questions can provide insights into the development of IA in adolescents and help determine whether there are universal patterns that emerge across different countries.

1.4. Current Study. The study had three primary objectives. First, it is aimed at identifying predictors of IA in adolescents across various cultures. This involved examining the influence of parental monitoring of children's internet use and activities, essential and nonessential internet use among adolescents, the frequency of parent–child arguments related to internet use, and the impact of parental IA. Second, the study sought to assess the patterns of symptoms of IA in parents and children and examine the correspondence between these symptoms across different countries. Third, we identified the most prevalent symptoms of IA in parents and children.

2. Methods

2.1. Methodological Approach. This study was a cross-sectional survey conducted online across five countries: The Cooperation Council for the Arab States of the Gulf (GCC), Turkey, the United Kingdom, Italy, and Greece. It was translated into the native language of each place, and the time needed to complete the survey depended on the language and place of data collection. We used the back-translation method to ensure the original meaning was preserved [76]. It took between 10 and 14 min on average. The survey was administered through Qualtrics and SurveyMonkey. Participants were recruited through Prolific (http://www.prolific.com/) for the United Kingdom and TGM Research for the Arab GCC and via an open call for the rest. All procedures for this study complied with international regulations on research with human participants.

2.1.1. Participants. The survey targeted adults with children aged 12–15, including biological parents, caregivers, foster parents, and stepparents. Both parents and caregivers were eligible to participate independently. In cases where parents had multiple children within the 12–15 age range, they were instructed to base their responses on the child nearest to 12 years of age. There was no restriction on parents' age, sex, or

other sociodemographic characteristics. However, one of the selection criteria was using the internet at home and allowing children to use the internet, corresponding to questions "do you as a parent/guardian use the internet at home" and "does your child use the internet at home?"

2.1.2. Ethical Approval. Ethical approval was granted by the Ethics Committee at Bournemouth University (Ethics Approval ID 45945, 21/12/2022). Before agreeing to participate, all respondents were provided with detailed informed consent forms regarding the purpose of the study, their responsibilities, risks and benefits of participating, and the privacy and protection of their data. Each participant could download a PDF version of the detailed informed consent form in their language for their records. The survey design was identical across all countries. After finishing the survey, participants were given links to national resources for digital literacy and digital parenting. The study did not collect any personally identifiable data. However, it was considered above the minimal risk due to data collection involving several countries.

2.1.3. Sample Size. According to the Qualtrics sample size estimator, with a population exceeding 1,000,000, a 95% confidence level, and a 5% margin of error, a minimum of 385 participants is required. Narrowing the confidence interval to 99% increases the ideal sample size to 666 participants. Considering an average response rate of 63% for short surveys [77], our minimum required sample size is adjusted to 579 respondents. To ensure the study's statistical power and validity, we aim for a sample size of 1057 participants, distributed evenly across five countries, resulting in approximately 211 participants per country. By having the subgroups from each country, we ensure that these countries are adequately represented in our data.

2.1.4. Survey Design and Collection Procedure. To enhance the survey's validity, we ensured it was accessible to the general population in each country by conducting it in their native languages. The survey did not include country-specific questions, allowing for a more uniform comparison across regions. The survey consisted of 28 questions divided into two sections. In Part 1, participants provided general demographic information, including age, sex, occupation, and education, and responded to questions assessing their IA symptoms and how they monitored their child's internet use. Part 2 focused on parental evaluations of their children's IA symptoms, along with the child's demographics (age, sex) and school performance. Parental reports were the primary data source for parental and adolescent internet use. This method was selected to reduce the potential biases often seen in adolescent self-reports [78, 79]. However, we acknowledge the limitation of relying solely on parents' reports of their children's behavior. Notably, the questionnaires assessing IA in parents and children were intentionally separated in the survey to prevent one set of responses from influencing the other. Details on data collection procedures in each country are provided in Supporting Information 1.

2.2. Data Quality Check and Preprocessing. After assessing the completed survey data, the raw data from each country were imported into Excel for translation into English, and an initial data quality check was performed, focusing on variable coding and calculating summary scores for the questionnaires. Then, the survey data were imported into a statistical software package for further analysis. The initial analysis identified missing values across several response fields, including the frequency of help needed for IA, child age, qualitative responses, and certain demographic variables such as employment, education, and financial status. However, none of the missing data exceeded 1% of the total for any variable. A visual examination using histograms and scatter plots showed no outliers relevant to the current analysis, although it was noted that four parents mistakenly reported their age as 12–14. Mean imputation was applied to address the missing values, using the average observed within the sample population. After completing the data cleaning process, the cleaned dataset was compared with the original raw data to ensure that all essential information was accurately preserved.

The final sample included 1530 respondents from five countries (243 from the Arab GCC, 450 from Greece, 250 from Italy, 183 from Turkey, and 404 from the United Kingdom).

2.3. Measurements

2.3.1. Internet Addiction Diagnostic Questionnaire (IADQ). The IADQ was used to evaluate both the presence and severity of internet dependence among parents in this study [8]. The questionnaire, adapted from the diagnostic criteria for pathological gambling, consists of eight binary-response items ("yes" or "no"), with total scores ranging from 0 to 8. Each item reflects symptoms of PIU, such as preoccupation with the internet, tolerance, repeated unsuccessful attempts to control usage, withdrawal symptoms, exceeding intended time spent online, risking or losing relationships and opportunities, deception to conceal the extent of use, and reliance on the internet as a dysfunctional coping mechanism [80]. The literature varies in how IA is classified using the IADQ. Young [80] suggests that a score of 5 or higher indicates internet dependency, while scores below 5 reflect nondependency.

Previous studies reported Cronbach's alpha values ranged between 0.60 and 0.72 [8]. In the present study, Cronbach's alpha for the whole sample was 0.74, indicating an acceptable level of internal consistency or reliability for a set of items within the IADQ (see Table 1 for Cronbach's alpha for each country). In addition, we tested agreement between the total score of IADQ and the perceived degree of problems associated with the use of the internet within respondents' households for each country, indicating that the total score on the IADQ is consistent with respondents' perceptions of internet-related problems in their households (Table 1). Item-to-item and item-to-total correlations for each country are reported in Supporting Information 2.

2.3.2. Parental Version of the Young Diagnostic Questionnaire (PYDQ). The Parent–Youth Diagnostic Questionnaire

TABLE 1: Psychometric parameters of measures in the present study.

Country	Cronbach's alpha for IADQ	Cronbach's alpha for PYDQ	Correlation between IA scores and the perceived degree of problems associated with the use of the internet within respondents' households	
			IADQ	PYDQ
GCC	0.65	0.78	$r = 0.26$, $p < 0.001$, [0.14, 0.38]	$r = 0.13$, $p = 0.04$, [0.01, 0.25]
Greece	0.66	0.76	$r = 0.25$, $p < 0.001$, [0.16, 0.34]	$r = 0.33$, $p < 0.001$, [0.24, 0.41]
Italy	0.64	0.67	$r = 0.31$, $p < 0.001$, [0.19, 0.42]	$r = 0.34$, $p < 0.001$, [0.22, 0.44]
Turkey	0.64	0.77	$r = 0.23$, $p = 0.002$, [0.09, 0.36]	$r = 0.26$, $p < 0.001$, [0.11, 0.39]
United Kingdom	0.74	0.74	$r = 0.41$, $p < 0.001$, [0.32, 0.49]	$r = 0.41$, $p < 0.001$, [0.33, 0.49]

Note: Squared brackets provide the lower and upper bounds for the 95% confidence interval.

(PYDQ) is a modified version of the IADQ, created to assess parents' perceptions of their children's PIU. This adaptation alters all eight items from the original IADQ, shifting the focus from a self-assessment to an external evaluation by replacing "you" with "your child." Like the IADQ, the PYDQ consists of eight items based on the pathological gambling criteria from the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* [81], with binary response options ("no" or "yes"). The close alignment between the IADQ and PYDQ allows for a comparative analysis of IA symptoms as perceived in both parents and their children.

The total PYDQ score is calculated by summing the responses to the eight items, with higher scores indicating a greater risk of IA among youth. In the current study, the reliability of the PYDQ across all countries was measured at 0.74 (see Table 1 for country-specific Cronbach's alpha estimates). Item-to-item and item-to-total correlations for each country are reported in Supporting Information 3.

2.3.3. Monitoring Time and Activities of Children's Internet Use. Parents were asked how often they monitor their adolescent's time spent online and how frequently they keep track of their adolescent's online activities. The answers were measured on a 6-point scale, where 1 indicated "*never*," 2 "*very rarely*," 3 "*rarely*," 4 "*occasionally*," 5 "*frequently*," and 6 "*very frequently*."

2.3.4. Frequency of Arguments With a Child About Internet Use. Parents were asked how often they have serious arguments with their children about excessive internet use, both on a typical school day and on a weekend. Responses were recorded on a 4-point scale: 1 (*no arguments*), 2 (*1–2 times*), 3 (*3–4 times*), and 4 (*more than 4 times*). For the analysis, we calculated the average responses to these two questions.

2.3.5. Child Internet Time. We asked parents to estimate how much time their child spends online, differentiating between essential and nonessential usage. These questions were also tailored to capture daily usage patterns on school days and weekends. These four questions are aimed at gathering more comprehensive information about the child's internet habits, taking into account the varying routines of children throughout the week. Parents were asked to provide an estimate for 1 day only.

2.3.6. Parental Need for Help in Dealing With Internet Use Challenges. Parents' recognition of the need for external help in dealing with internet use challenges—whether for themselves, their children, or both—is associated with a heightened awareness of the issues and the importance of addressing them. This awareness represents a crucial shift in mindset, where recognizing a problem leads to a proactive search for solutions and support [82]. Our study asked participants how often they need help with internet use challenges. We offered six response options: 1—never, 2—very rarely, 3—rarely, 4—occasionally, 5—frequently, and 6—very frequently. This question not only measures the frequency of seeking help but also may serve as an indirect indicator of the severity of IA within the household.

2.4. Data Analysis

2.4.1. Assessing Demographics and Study Variables. We summarized participants' sociodemographic characteristics and provided average estimates and variations for all variables in the present study. Since this is the first study to examine the monitoring and mediation factors predicting IA in adolescents across multiple countries, we provide the original dataset, which can serve as a starting resource for future research, helping to estimate effect sizes and determine appropriate sample sizes and identifying trends for generating further hypotheses.

2.4.2. Testing Measurement Invariance. We employed multigroup confirmatory factor analysis (MG-CFA) within structural equation modeling (SEM) to evaluate whether the factor structure of our measures was consistent across different cultural groups. Four models were defined: configural, weak, strong, and strict. Configural invariance implies that the number of latent variables and the pattern of loadings of latent variables on indicators are similar across the groups. Weak invariance shows that the magnitude of the loadings is similar across the groups. Strong invariance indicates that not only the item loadings but also the item intercepts are similar across the groups. Strict invariance implies that in addition to loadings and intercepts, the residual variances are similar across groups. Prior testing these models, we specified and tested the baseline model [83]. To define invariance, we used the difference in comparative fit index (CFI) (ΔCFI) with cutpoint of $\Delta\text{CFI} < 0.01$ to decide

whether a more constrained model, such as the weak-invariance model, shows a substantial decrease in model fit compared to a less constrained model, such as the baseline model [84]. All calculations were performed in R (packages lavaan, semTools, and semPlot) following steps proposed by Hirschfeld and von Brachel [83]. Anova() function in R was used for model comparisons.

2.4.3. Testing Predictors of IA in Children. Multivariable regressions were conducted for each country's dataset, using PYDQ scores as the dependent variable and seven predictors: parental IA scores (IADQ), parental monitoring time and activities related to children's internet use, time spent by children on essential and nonessential internet use, the frequency of arguments between parents and children about internet overuse, and parental need for help in managing internet use challenges. For each dataset, several assumptions were tested. First, we evaluated whether the residual values were normally distributed using normal probability plots. Second, we assessed multicollinearity by calculating a matrix of Pearson's correlations among all predictors and determining the variance inflation factor (VIF). Third, we checked for heteroscedasticity by examining residuals plotted against fitted values and Durbin–Watson values (which ranged between 0.6 and 1.8 across all models, indicating that the data met the assumption of independent errors). These analyses showed that all datasets met the assumptions required for multivariable regression.

Additionally, we conducted the same regression analyses using a Bayesian framework, applying Bayesian model averaging to determine the posterior probability of the inconsistent discipline predictor, considering all possible candidate models (i.e., the number of models constructed from all predictors in this regression). Assuming that all models are equally likely a priori [85], we estimated the posterior summaries of coefficients. We calculated the inclusion Bayes factor (BFinc), which quantifies how much more likely the observed data are under models that include a particular predictor than models that do not.

2.4.4. Testing Intergenerational Pattern of IA Symptoms. Each item in the IADQ and PYDQ uses binary response formats to indicate whether corresponding symptoms are present or absent. To explore the relationship between these binary data, we used a generalized linear mixed model (GLMM) approach [86]. A key benefit of employing GLMM is its ability to manage hierarchically clustered data, where assessments (both self and adolescent) are nested within each parent. Specifically, GLMM enables us to address this nested data structure by incorporating and estimating the random variance associated with each subject within the model.

Furthermore, because observations from the same individual are typically more similar to each other than those from different individuals, conventional statistical methods that assume independent data would yield inaccurate variance estimates and, consequently, incorrect p values. GLMM is beneficial in accounting for such nonindependence, providing an estimate of cluster correlation [87]. Specifically, we calculated the proportion of total variance in IA symptoms attributable to clustering by determining the ratio of between-cluster variance to total variance, known as the intraclass correlation (ICC). The ICC helps us measure the correlation among observations within the same participant.

We assumed responses followed a binomial distribution for model parameter estimation and employed the logit link function. A simple coding scheme was used, centered at zero, to compare each means with that of the reference category, which was defined as the first category appearing in the variable levels, and the interpretation of results was adjusted accordingly. We computed the mean and standard deviation using the available data for items with missing data (less than 0.02%). The relationship between binary outcomes and categorical predictors was expressed as odds ratios (ORs), comparing the odds of an event occurring in each predictor category relative to the reference category, assuming other variables remain constant. All post hoc tests were conducted with Bonferroni corrections to account for multiple comparisons. Standard errors and confidence intervals were computed using the profile likelihood–based confidence interval method [88], where the bounds were determined based on chi-square distribution percentiles around the maximum likelihood estimate.

2.4.5. Examining Prevalent Symptoms of IA in Parents and Children Across Countries. We calculated the probability of each symptom of IA for both the IADQ and PYDQ assessments, along with the corresponding 95% confidence intervals for these probability estimates across different countries. Our goal was to provide an evaluation of the most and least prevalent symptoms of IA on a global scale. This analysis allowed us to identify which symptoms are most commonly reported and less frequently observed, offering valuable insights into the patterns of IA across diverse populations.

Additional analyses along with datasets and data dictionary are reported in Supporting Information 4.

3. Results

3.1. Demographic Description and Study Variables. Descriptive statistics of our sample are described in Table 2.

3.2. MG-CFA for Testing Measurement Invariance. The results of model comparisons for IADQ and PYDQ are summarized in Table 3.

The series of model comparisons for the IADQ and PYDQ (Table 3) suggest that factor loadings can be considered equivalent across groups, as the chi-square tests were nonsignificant and the change in CFI (ΔCFI) remained below the recommended threshold. This indicates that the constructs were measured similarly across different groups at the metric invariance level. However, when intercepts were constrained to be equal across groups, a significant increase in the chi-square value and a substantial change in CFI suggested that strong invariance was not achieved. This implies that while participants from different groups interpreted the constructs in a comparable way, their mean scores

TABLE 2: Descriptive statistics.

	GCC ($N = 243$)	Greece ($N = 450$)	Italy ($N = 250$)	Turkey ($N = 183$)	United Kingdom ($N = 404$)
Parents' age	39.25 (6.76)	45.89 (5.95)	46.52 (5.72)	42.92 (5.32)	44.91 (8.10)
Children's age	12.57 (1.92)	13.36 (1.24)	13.36 (1.38)	13.17 (1.17)	13.30 (1.31)
Parents' sex					
Males	127 (52.3%)	94 (20.9%)	60 (24.0%)	34 (18.6%)	202 (50.5%)
Females	116 (47.7%)	356 (79.1%)	190 (76.0%)	149 (81.4%)	200 (49.5%)
Children's sex					
Males	140 (57.6%)	226 (50.2%)[a]	136 (54.4%)	91 (49.7%)	227 (56.2%)[b]
Females	103 (42.4%)	221 (49.1%)	114 (45.6%)	92 (50.3%)	176 (43.6%)
IADQ	3.92 (1.90))	1.64 (1.60)	0.87 (1.27)	2.63 (1.82)	2.63 (1.99)
PYDQ	3.47 (2.24)	1.64 (2.18)	1.46 (1.57)	3.04 (2.21)	2.60 (1.01)
Mean frequency of arguments about internet use					
School days	2.03 (0.80)	2.07 (0.80)	2.04 (0.79)	1.98 (0.86)	1.57 (0.65)
Weekends	1.88 (0.89)	2.20 (0.81)	2.14 (0.85)	2.20 (0.92)	1.53 (0.67)
Children internet use[c]					
School day					
Essential	2.52 (1.60)	1.51 (2.39)	1.79 (1.23)	1.96 (2.22)	1.78 (1.38)
Nonessential	2.03 (1.56)	2.27 (2.63)	2.12 (1.48)	1.92 (1.56)	2.44 (1.51)
Weekend					
Essential	3.03 (1.72)	2.28 (2.87)	2.04 (1.45)	2.69 (2.16)	2.03 (1.54)
Nonessential	3.33 (1.07)	4.40 (3.46)	3.09 (2.18)	3.80 (3.18)	4.31 (2.38)
Parental monitoring time on internet					
Very frequently	14%	31%	15%	16%	5%
Frequently	48%	46%	45%	42%	31%
Rarely	6%	4%	8%	10%	10%
Occasionally	28%	15%	24%	20%	36%
Very rarely	2%	3%	6%	9%	13%
Never	2%	1%	3%	4%	4%
Parental monitoring activities on internet					
Very frequently	21%	27%	18%	16%	7%
Frequently	46%	37%	35%	39%	35%
Rarely	5%	6%	7%	22%	9%
Occasionally	23%	23%	26%	11%	35%
Very rarely	4%	6%	10%	10%	10%
Never	2%	1%	4%	1%	3%
Parental need for help					
Very frequently	15%	24%	2%	6%	2%
Frequently	10%	18%	6%	13%	6%
Rarely	12%	18%	20%	34%	23%
Occasionally	46%	31%	17%	13%	15%
Very rarely	12%	5%	21%	30%	29%
Never	5%	3%	34%	17%	27%

[a]Three parents responded "prefer not to say" (0.7%).
[b]One parent responded "prefer not to say" (0.2%).
[c]Average hours per day.

may not be directly comparable due to potential differences in response tendencies across cultures. Although strong invariance was not achieved, the measures can still be used across cultures based on the establishment of metric invariance, which confirms that the constructs are being interpreted similarly across groups [89].

TABLE 3: Series of model comparisons.

Model	CFI (ΔCFI)	Chisq (Δ Chisq)	*p* value	Df (ΔDf)	CFI (ΔCFI)	Chisq (Δ Chisq)	Df (ΔDf)	*p* value
Configural	0.95	293.26	< 0.001	80	0.92	206.67	80	< 0.001
Weak invariance	(0.007)	(4.14)	0.14	(21)	(0.006)	(6.93)	21	0.08
Strong invariance	(0.15)	(43.49)	< 0.001	(21)	(0.19)	(55.96	21	< 0.001
Strict invariance	(0.26)	(87.88)	< 0.001	(3)	(0.12)	(24.26)	3	=0.001

Note: ΔCFI < 0.01 implies that the invariance assumption still holds.

3.3. Predictors of IA in Children: Multivariable Regressions. A multivariable regression analysis was conducted on each country dataset to determine whether the following factors could predict adolescents' IA scores: parental IA scores, parental monitoring time and activities related to children's internet use, the time children spent on essential and nonessential internet use, the frequency of arguments between parents and children about internet overuse, and the parents' need for help in managing internet use challenges.

Below, we provide a short report of the results for each country and summarize them in Table 4. Details of full reports are provided in Supporting Information.

3.3.1. GCC. The overall model was significant ($F(7,224) = 28.71$, $p < 0.001$), explaining 47% of the variance in the predictors. Four variables predicted adolescents' IA scores: parents' IA scores ($\beta = 0.27$, 95% CI [0.16, 0.39], $t = 4.81$, $p < 0.001$), average nonessential internet use ($\beta = 0.15$, 95% CI [0.04, 0.26], $t = 2.64$, $p = 0.009$), frequency of arguing ($\beta = 0.40$, 95% CI [0.29, 0.51], $t = 7.20$, $p < 0.001$), and parental need for help ($\beta = 0.12$, 95% CI [0.01, 0.23], $t = 2.11$, $p = 0.04$). However, when we reran the analysis using a Bayesian approach, we found little support for the importance of the parental need for help variable. Specifically, the BFinc—which quantifies how much more likely the observed data are under models that include a particular predictor compared to those that do not—was only 1.01 for the parental need for help. In contrast, the BFinc was very strong for parents' IA scores and frequency of arguing (BFinc > 100) and moderate for nonessential internet use (BFinc = 4.54).

3.3.2. Greece. The overall model accounted for 42% of the variance in the predictors ($F(7,442) = 46.43$, $p < 0.001$). Significant predictors of adolescents' IA scores included parent IA scores ($\beta = 0.31$, 95% CI [0.23, 0.48], $t = 7.93$, $p < 0.001$), time spent on nonessential internet use ($\beta = 0.12$, 95% CI [0.04, 0.20], $t = 2.84$, $p = 0.005$), frequency of arguments about internet overuse ($\beta = 0.24$, 95% CI [0.15, 0.32], $t = 5.76$, $p < 0.001$), and parents' need for help ($\beta = 0.26$, 95% CI [0.18, 0.34], $t = 6.33$, $p < 0.001$). The BFinc for nonessential internet use was 5.48, while for the other three predictors, it was greater than 100.

3.3.3. Italy. The model accounted for 47% of the variance in the predictors ($F(7, 242) = 30.07$, $p < 0.001$). Five variables emerged as significant predictors of PYDQ scores: IADQ scores ($\beta = 0.26$, 95% CI [0.16, 0.36], $t = 5.22$, $p < 0.001$), frequency of arguments about internet overuse ($\beta = 0.23$, 95% CI [0.12, 0.35], $t = 4.02$, $p < 0.001$), and parents' need for help ($B = 0.29$, 95% CI [0.17, 0.41], $t = 4.89$, $p < 0.001$). Notably, both essential and nonessential internet use in children were significant predictors, though they had opposite effects: an increase in essential internet use was associated with a decrease in PYDQ scores ($\beta = -0.21$, 95%*CI* [−0.32, −0.11], $t = -3.99$, $p < 0.001$), whereas an increase in nonessential internet use was linked to higher IA scores in adolescents ($\beta = 0.26$, 95% CI [0.16, 0.32], $t = 5.22$, $p < 0.001$). Bayesian analysis further supported these findings, with BFinc exceeding 100 for all predictors.

3.3.4. Turkey. The model accounted for a substantial 50% of the variance in the predictors ($F(7, 175) = 24.74$, $p < 0.001$). Notably, four key variables emerged as significant predictors of children's IA scores: parental IA, nonessential internet use, frequent arguments about internet overuse, and the parental need for help. The impact of these factors is underscored by the following coefficients: parental IA ($\beta = 0.18$, 95% CI [0.06, 0.19], $t = 2.94$, $p = 0.004$), nonessential internet use ($\beta = 0.21$, 95% CI [0.08, 0.33], $t = 3.27$, $p < 0.001$), arguments about internet overuse ($\beta = 0.17$, 95% CI [0.05, 0.29], $t = 2.73$, $p = 0.007$), and parental need for help ($\beta = 0.39$, 95% CI [0.26, 0.52], $t = 6.10$, $p < 0.001$). The Bayesian factor (BFinc) showed compelling evidence for the influence of arguments about internet overuse, with a value exceeding 100, suggesting a highly likely impact. For IADQ scores, the BFinc values for nonessential internet use and parental need for help were 9.44, 22.63, and 12.66, respectively. This indicates that models incorporating these predictors are approximately 9, 23, and 13 times more likely to be accurate than those without them across all considered models.

3.3.5. United Kingdom. The model explained 48% of the variance in the predictors ($F(7, 395) = 51.48$, $p < 0.001$). The analysis identified four significant predictors of IA scores in children: parental IA scores, nonessential internet use by the child, conflicts related to excessive internet use, and the parental need for assistance. These variables were associated with the following coefficients: parental IA ($\beta = 0.33$, 95% CI [0.25, 0.42], $t = 8.22$, $p < 0.001$), nonessential internet use by the child ($\beta = 0.24$, 95% CI [0.16, 0.31], $t = 5.99$, $p < 0.001$), arguments about internet overuse ($\beta = 0.26$, 95% CI [0.17, 0.34], $t = 6.13$, $p < 0.001$), and parental need for help ($\beta = 0.18$, 95% CI [0.10, 0.27], $t = 4.14$, $p < 0.001$). Each of these predictors was supported by strong evidence, as indicated by a BFinc greater than 100.

3.4. Intergenerational Pattern of IA Symptoms. To explore whether the correspondence between parental and

TABLE 4: Summary: Predictors of internet addiction in children.

	Predictors of internet addiction in children						
		Parental monitoring				Child internet use	
	IADQ	Time	Activities	Arguments about overuse	Parental need for help	Essential	Nonessential
GCC	✓	—	—	✓	✓	—	✓
Greece	✓	—	—	✓	✓	—	✓
Italy	✓	—	—	✓	✓	✓	✓
Turkey	✓	—	—	✓	✓	—	✓
United Kingdom	✓	—	—	✓	✓	—	✓

Note: ✓ indicates significant predictor. — indicates that predictor was not significant.

adolescent IA symptoms is consistent across countries, we first examined the extent to which parental symptoms were associated with adolescent symptoms within each country. We used a GLMM to test the effects of the person being assessed (parent or adolescent) and symptoms of IA (preoccupation with the internet, tolerance, unsuccessful efforts to control use, withdrawal, loss of control over time, relationship issues, concealing usage, and dysfunctional coping) on the presence or absence of these symptoms, as indicated by "yes" or "no" responses.

The results showed that in each country, excluding the United Kingdom, there was a fixed effect of person of assessment indicating significant differences between IADQ and PYDQ. In Italian, Greek, and Turkish datasets, parents estimated adolescent's IA higher than their own ($\beta = 0.44$, 95% CI [0.33, 0.59], $z = 5.60$, $p < 0.001$; $\beta = 0.19$, 95% CI [0.17, 0.23], $z = 20.99$, $p < 0.001$; $\beta = 0.60$, 95% CI [0.49, 0.75], $z = 4.62$, $p < 0.001$). In GCC, we observed an opposite effect—parents estimated their level of IA as higher than in adolescents ($\beta = -1.36$, 95%CI [−1.61,−1.31], $z = -3.48$, $p < 0.001$). In the United Kingdom, there was no difference between parental and adolescent levels of IA ($\beta = 0.93$, $z = 0.94$, $p = 0.35$) (see detail in a country-specific GLMM analysis in the Supporting Information).

The GLMM analysis in each country also revealed a fixed effect of symptoms of IA, indicating that the symptoms of IA exhibited considerable heterogeneity, with some symptoms presenting at high levels while others were relatively low ($\chi^2 = 642.20$, df = 7, $p < 0.001$; $\chi^2 = 995.59$, df = 7, $p < 0.001$; $\chi^2 = 349.44$, df = 7, $p < 0.001$; $\chi^2 = 398.45$, df = 7, $p < 0.001$; and $\chi^2 = 1037.89$, df = 7, $p < 0.001$, for GCC, Greece, Italy, Turkey, and United Kingdom, respectively).

Furthermore, there was interaction between a person of assessment and symptoms of IA ($\chi^2 = 82.81$, df = 7, $p < 0.001$; $\chi^2 = 147.41$, df = 7, $p < 0.001$; $\chi^2 = 80.93$, df = 7, $p < 0.001$; $\chi^2 = 48.97$, df = 7, $p < 0.001$; and $\chi^2 = 119.87$, df = 7, $p < 0.001$, for GCC, Greece, Italy, Turkey, and United Kingdom, respectively). Figure 1 visualizes the interaction term for each country. The results indicate that, generally, the patterns of IA symptoms are strikingly similar between parents and their children. Additionally, comparing these patterns across different countries visually suggests high similarity. However, the analysis also uncovered country-specific differences in the manifestation of IA symptoms between parents and adolescents (see symptoms denoted by an asterisk in Figure 1 and a detailed analysis of the interactions is provided in the Supporting Information section).

It has to be noted that the ICC parameter in each dataset (0.35, 0.38, 0.41, 0.31, and 0.40 for GCC, Greece, Italy, Turkey, and United Kingdom, respectively) indicates that the random effect of subjects explains a significant part of the variation in the outcome.

3.5. Prevalent Symptoms of IA in Parents and Children Across Countries. The GLMM analysis also revealed that some symptoms of IA are more prevalent than others across all countries (Figure 1). To further investigate this, we calculated the average probability of each symptom across countries for both types of assessments (IADQ and PYDQ) (Figure 2). This analysis indicated that two symptoms (lying to conceal the extent of internet use and losing relationships or opportunities due to internet use) consistently showed the lowest probabilities across the board. This suggests that while these symptoms are present, they are less common compared to other symptoms of IA.

4. Discussion

Three key objectives drove this study. First, we explored seven potential predictors of IA in adolescents, delving into factors such as how closely parents monitor their children's online time and activities, the balance between essential and nonessential internet use, the frequency of arguments between parents and children over internet use, the possible influence of parents' IA, and the need for help in dealing with internet use challenges. Second, we mapped out the patterns of IA symptoms in both parents and children, examining how these symptoms align across various countries. Finally, we sought to pinpoint the most prevalent symptoms of IA affecting both parents and children. The results of our study uncovered several novel findings, making theoretical and empirical contributions to the field.

4.1. Predictors of IA in Adolescents. Four out of the seven variables tested were identified as significant predictors of adolescent IA: parents' IA, the amount of time children spend on nonessential internet activities, the frequency of arguments between parents and adolescents over excessive internet use, and parents' need for help to manage internet-related issues. This finding aligns with previous studies, which have also demonstrated a connection between

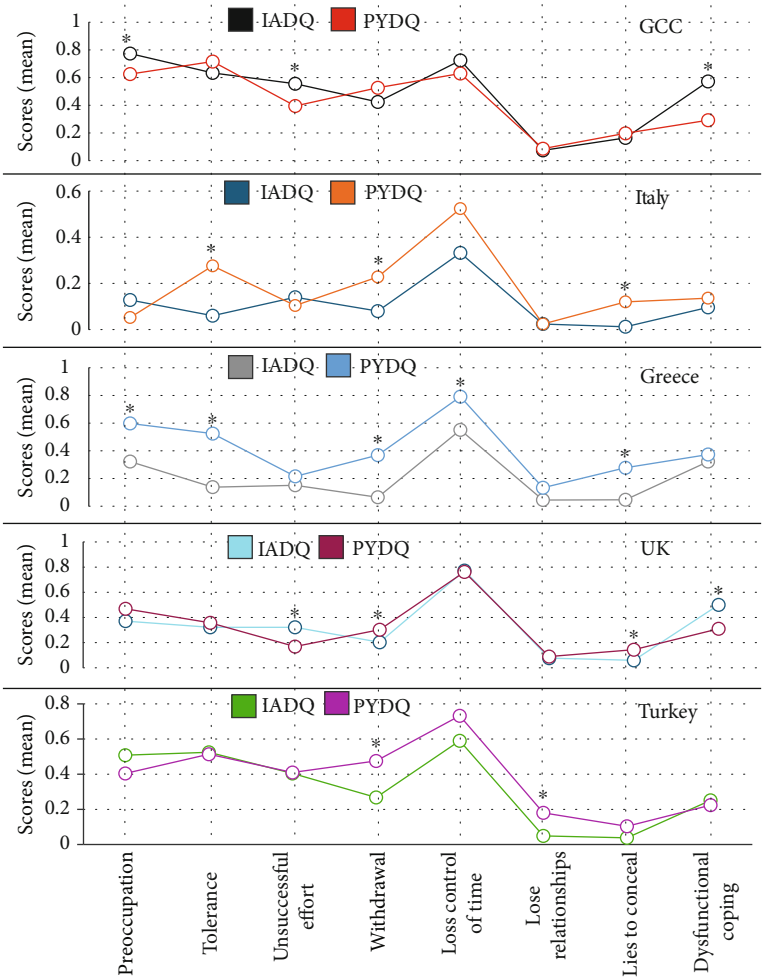

FIGURE 1: Symptoms of internet addiction in parents (IADQ scores) and adolescents (PYDQ scores). *Note.* The *x*-axis represents symptoms of internet addiction; the *y*-axis depicts the proportion of participants who indicated the presence of these symptoms. Asterisks denote significant differences between the symptoms in parents and their adolescents after adjustment for multiple comparisons in the interaction term (person being assessed ∗ symptoms of internet addiction).

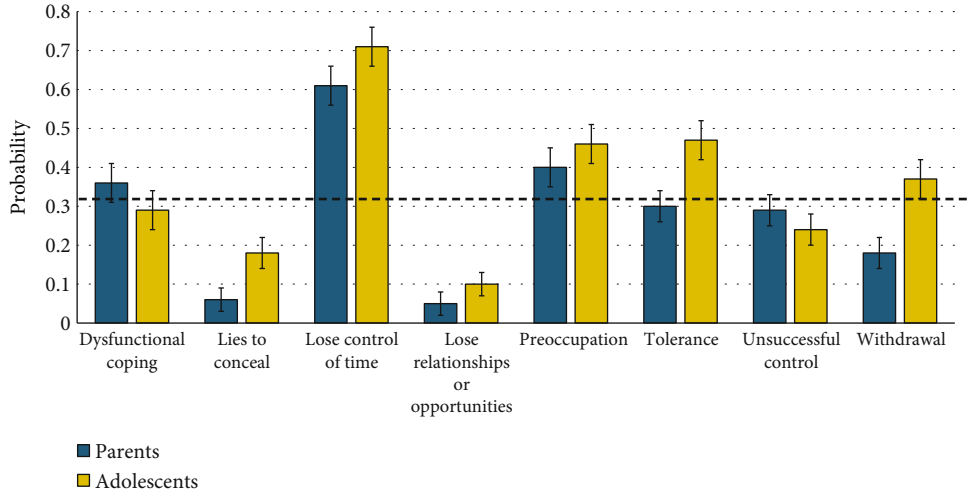

FIGURE 2: The probability of internet addiction symptoms. *Note.* Error bars represent a 95% confidence interval for the estimated probability. The horizontal dashed line denotes the mean probability across all symptoms.

these predictors and IA in adolescents. For instance, it was demonstrated that children often imitate their parents' internet use patterns, leading to similar addictive behaviors [90]. Studies also highlighted the role of parental modeling in the development of children's internet use habits, particularly in families where parents themselves struggle with IA [91]. Additionally, the amount of time adolescents spend on nonessential internet activities has consistently been linked to an increased risk of IA, as it may replace more constructive activities and contribute to unhealthy dependency [92, 93].

Two other variables—the parental need for help in managing internet overuse and the frequency of arguments related to it—that emerged as robust predictors of adolescent IA scores across all countries are particularly noteworthy. From a psychosocial perspective, recognizing the need for help marks a critical turning point where an individual acknowledges that their coping mechanisms are inadequate. This realization often triggers a shift toward seeking external support and understanding that one's internal and external resources are insufficient to manage the challenges at hand effectively [20, 94, 95]. When parents recognize their need for help, it may indicate that they are reaching the limits of their ability to guide or control their child's internet usage. Such awareness highlights the strain on family dynamics and signals the potential for escalating conflict. According to Bronfenbrenner's ecological systems theory [20], frequent family conflicts can indicate rising tension and a communication breakdown, often linked to higher levels of IA in adolescents [2, 66, 96]. Future research should explore these predictors further to understand their interaction with adolescent IA to inform prevention and intervention strategies.

In contrast to previous studies emphasizing the protective role of parental oversight [22, 33], our findings suggest that parental monitoring of time and activities alone may be insufficient to predict PIU among adolescents. This finding aligns with earlier studies that have questioned the reliability of parental monitoring as a standalone intervention [40, 41]. Research also indicated that monitoring children's internet use is often technically ineffective for several reasons. Firstly, adolescents tend to be more tech-savvy than their parents, enabling them to bypass or undermine parental controls and monitoring efforts [97]. Secondly, IA is not solely determined by the amount of time spent online but also by psychological factors such as preoccupation with internet use, fear of missing out (FoMO), and cravings for online engagement, which can be even more detrimental to mental health [98]. A report by Ofcom in 2016 further highlighted this issue by revealing that FoMO increased among individuals who underwent a "digital detox," suggesting that simply reducing screen time may exacerbate underlying anxieties and compulsions related to internet use [99]. The fact that parental monitoring failed to predict adolescent IA across all countries in the present study indicates the consistency of this finding.

Additionally, the correlation between the frequency of arguments and IA in children suggests that neither monitoring nor argumentation are effective strategies. These findings call for exploring more complex approaches. For instance, shifting the focus from mere supervision to more holistic approaches that include fostering strong parent–child relationships, enhancing adolescents' self-regulation skills, and addressing social drivers of excessive internet use could better predict the development of IA in adolescents.

4.2. Patterns of IA Symptoms in Parents and Adolescents. Our results demonstrated a tight correspondence between the patterns of IA symptoms in parents and those in adolescents, which may explain our finding that parental IA was a strong predictor of adolescents' IA scores. This finding highlights the potential for intergenerational transmission of IA behaviors, where the habits and challenges faced by parents in managing their internet use may play a role in shaping similar behaviors in their adolescents. Indeed, science has examples demonstrating that this type of transmission does occur. For instance, recent research provided evidence of cross-generational factors of addictive behavior in smartphone usage [100], IA [32, 101], and gambling [102]. This study went a step further by showing that the correspondence between parental and adolescent symptoms of IA is generally consistent across all countries. This finding reinforces the idea that the influence of parental behavior on adolescent IA may not be confined to specific cultural or geographical contexts [103–105]. Moreover, the observed similarity in IA symptoms between parents and adolescents across countries further validates these findings, suggesting that the mechanisms driving this transmission are likely rooted in common factors across diverse populations. This makes intergenerational IA a global concern that warrants attention on an international scale.

Previous studies on the prevalence of IA among adolescents reveal considerable differences across countries, mainly due to variations in sampling techniques, definitions, assessment tools, and sociocultural influences [5, 106–108]. In contrast, the methodological approach in this study was standardized across countries, ensuring that the data could be meaningfully compared on an international scale. Unlike previous studies that focused on parental style and family dynamics, our research directly examined the link between parental IA and its symptoms in their children. This connection could provide a deeper understanding of the intergenerational transmission of IA. For example, parents and adolescents in the present study reported spending more time online than initially intended, suggesting a loss of control over time management. This pattern is likely influenced by several characteristics of modern digital platforms, which are purposefully engineered to maximize user engagement by providing an easy-to-access continuous flow of content and activities that trigger excitement, positive emotions, and reward processes in the brain [26, 109]. The extent of the influence is evident from the pattern of the symptoms of IA across countries where around 60% of parents and 70% of adolescents revealed this symptom. This finding indicates that advocating for more responsible design practices in digital platforms may be crucial to mitigating the risks of excessive use and potential addiction.

Another noteworthy finding in this study is the symptom of preoccupation with the internet, which was more prevalent than average across the entire sample. This

symptom was observed in both parents and adolescents. Among adolescents, preoccupation with internet use was associated with various factors, including the need for social interaction during crucial developmental stages [110], the FoMO [111], and the opportunity to explore different aspects of identity in a relatively safe and anonymous environment [112]. Additionally, adolescents could be driven by the reinforcement of certain behaviors or identity aspects [113], the use of the internet as a distraction from real-life responsibilities or challenges [114], and the access to information, entertainment, and social interaction, which can be highly gratifying [115]. All these factors can contribute to frequently checking online profiles and messages among adolescents.

In contrast, there is significantly less research on parents' preoccupation with the internet. The few studies available suggest that this behavior in parents may be associated with interpersonal relationship issues [116], loneliness [117], work-related online presence [91], and the use of digital entertainment, including streaming services and online gaming, as a form of escapism from daily stress [118]. Additionally, the convenience of online shopping is another factor contributing to parents' increased internet use. Despite the growing recognition of IA among parents [32, 74], the research into its symptoms remains limited, and there is a need for more comprehensive studies that explore the full spectrum of reasons behind parents' internet use, especially considering the potential implications for family dynamics and child development.

Interestingly, parents and their adolescents showed relatively low scores on two symptoms associated with the "risk or loss of relationships or opportunities" and "lying to conceal the extent of internet use," considering that losing a relationship or lying to cover unwelcomed behavior, in general, is stigmatized in any society, leading to the possibility that parents who were the respondents might be embarrassed to disclose any of such tendencies. The social desirability phenomenon found even in surveys can support this explanation [119]. On the other hand, there is also a possibility that some of the symptoms of IA are no longer relevant, and the measurement requires a revision. For example, in the past, heavy internet use was often associated with a significant risk of losing personal relationships or missing out on real-world opportunities. Concerns were raised that excessive online activity could lead to social isolation, diminished interpersonal skills, and a detachment from real-life interactions. However, in the current digital age, these concerns may no longer be as relevant. The internet has become deeply integrated into our daily lives, transforming how we communicate, work, and build relationships. Social media and messaging apps allow individuals to stay in touch with friends and family across distances, often fostering stronger bonds than possible without these technologies [120, 121].

4.3. Limitations, Advantages, and Future Directions. Our study should be interpreted under several limitations. First, the voluntary sampling method used in this study introduces potential bias, as it may disproportionately include parents at the extremes of internet usage. Those with heavy internet-using children may participate out of concern, while those with minimal usage may join out of curiosity. This skew could limit the generalizability of the findings, as the sample may not accurately reflect the broader population. Future research could benefit from using a more randomized approach to achieve a more representative sample, thereby further strengthening the validity of the conclusions.

Second, due to the self-report nature of our survey, we cannot rule out the possibility of response biases.

Third, given the cross-sectional design of this study, it is important to mention that causal relationships cannot be established. Although our research questions did not focus on causality, future research should consider using a longitudinal design. For instance, employing a longitudinal hierarchical linear model with time-varying covariates could test the directionality of causal relationships by analyzing the effects of time-lagged predictors on adolescent IA scores.

Fourth, our study examined predictors of adolescent IA based on parental reports, recognizing that parents provide unique insights into their child's internet use within the home environment. Their assessments capture behavioral patterns that adolescents may not self-report due to social desirability bias or lack of self-awareness. However, parental attributions can shape perceptions of their child's behavior, potentially influencing the observed similarity in IA symptoms between parents and children. The attribution bias context model suggests that, despite these biases, parental reports remain meaningful as they reflect the specific environments in which behaviors are observed [122]. It has to be noted that this model accounts for more than just attribution biases, considering the broader context influencing parental perceptions. In addition, parents may have limited awareness of their child's online activities outside the home, which could lead to under- or overestimation of PIU [123].

Fifth, our study relied on internationally accepted measurements of IA in parents and children. These instruments could not have been validated against any golden standard since the basic concept of IA is still under debate. Therefore, it is important to continue carrying out research mapping symptoms of IA in parents and children to document the evidence of the developing interpenetrative IA over time.

Six, although metric invariance for the IADQ and PYDQ indicated that the relationships between items and the underlying latent constructs were equivalent across countries in the present study, more research is needed into the effects of cultural differences on the IADQ and PYDQ. It has to be noted that achieving full invariance in cross-cultural studies is often challenging due to differences in response styles, cultural norms, and social desirability biases [124]. In the present study, we did not intend for a direct mean comparison across cultures focusing on effect sizes and structural relationships between IADQ and PYDQ. However, future research that aims for a direct comparison across cultures should be aware about potential invariance issues for more strict models.

Despite these limitations, our findings have theoretical, methodological, and practical implications for addressing adolescent IA. IA is a global phenomenon, indicating that

its core features and underlying mechanisms are likely to be universal across different populations. To effectively study these universal features, research must include diverse cultural contexts to ensure that culture-specific variations do not restrict findings. On the other hand, focusing on the more detailed aspects of IA within a specific population can provide nuanced insights that are particularly relevant to that group. This approach can deepen our understanding of how IA manifests in different cultural settings. By considering both the universal and culture-specific aspects of IA, we can better develop the theoretical foundations of the phenomenon.

Recent research suggested to consider the role of social–emotional competence in understanding of behavioral addiction [125]. Given that social–emotional skills contribute to self-regulation, impulse control, and healthy social interactions, their assessment alongside IA measures can provide deeper insights into the psychological factors influencing PIU. Therefore, including assessment of social–emotional competence in future studies can be helpful to clarify its potential protective or risk-enhancing effects on IA.

The intergenerational transfer of IA and other forms of digital addiction is an emerging topic within the field of human–computer interaction. Developing methodological approaches to measure IA consistently across different generations could be a valuable path forward. Our study demonstrated that mapping the symptoms of IA in parents and children can offer detailed insights into how these behaviors manifest across generations. This approach not only enhances our understanding of digital addictions but also provides a foundation for developing targeted interventions to address these issues within families. A crucial next step would be to develop methodologies that assess the bidirectional transfer of IA, examining how these behaviors are transmitted from older to younger generations and vice versa.

Our study supports the results of recent research, indicating that parental IA is a strong predictor of IA in adolescents. Additionally, we extended previous research by showing that the patterns of IA symptoms in both parents and children are consistent across different cultures. These findings can be helpful for practitioners working with families of adolescents.

4.4. The Implications of the Findings on Family Intervention. The development of digital interventions for children and adolescents remains in its early stages [126], indicating the need for family-centered approaches to manage IA. Rather than relying solely on monitoring strategies such as time restrictions and content control, effective interventions should prioritize enhancing parental digital literacy and communication skills. Given the significant influence of parents' internet behaviors on their children's digital habits, psychoeducational programs grounded in Bandura's social learning theory [63] and family-based approaches [127] should raise awareness of their modeling role in fostering responsible internet use. These programs should also equip parents with strategies to encourage open discussions, manage digital conflicts, and promote healthy online habits. Where necessary, professional support should be available to help parents reflect on and manage their own IA, ensuring a holistic approach to prevention and intervention.

Furthermore, while digital monitoring tools, such as parental control apps, are widely available, they remain underutilized due to usability challenges, limited functionality, and a lack of adaptability to family needs [128]. Technology developers should expand beyond basic monitoring tools to create more comprehensive, family-centered digital interventions. For example, dashboards that track each family member's screen time can promote mutual awareness of online behaviors. Additionally, designing interactive apps that facilitate joint activities can help reduce excessive screen time, provide educational content for parents, and foster open communication between parents and children, ultimately promoting healthier digital habits within the family. Drawing parallel with family-centered interventions in other health fields, research has shown that involving parents as active participants in treatments, such as childhood obesity programs, leads to positive outcomes [129]. This evidence suggests that collaborative, family-centered approaches could be effective in digital health, encouraging healthier internet habits within the family. Ultimately, fostering parental self-awareness alongside structured family interventions is crucial in preventing the reinforcement of problematic patterns, as their actions—both verbal and nonverbal—serve as powerful models for their children.

4.5. Conclusion. This study demonstrated the critical role of parental IA, the time adolescents spend on nonessential internet activities, and the frequency of parent–adolescent conflicts over internet use as significant predictors of adolescent IA across multiple countries, including the GCC region, Greece, Italy, Turkey, and the United Kingdom. The consistency of these findings across diverse cultural contexts suggests that these factors serve as universal indicators of adolescent IA. Notably, parental monitoring of internet time and activities and time spent on essential internet use were unreliable predictors, indicating that the quality of internet use rather than the quantity may be more critical in understanding IA.

The strong correspondence between the patterns of IA symptoms in parents and adolescents suggests the importance of assessing both groups to obtain a comprehensive understanding of IA within families. The most prevalent symptoms, such as spending more time online than intended and preoccupation with the internet, were universally observed among parents and adolescents, reinforcing the need for a holistic approach to addressing IA. Additionally, the less frequent yet significant symptoms, including the risk of losing relationships or opportunities and lying to conceal internet use, further highlight the complex nature of IA and call for future research.

Data Availability Statement

The raw data supporting the findings of this study are available upon request. Requests can be made by contacting Prof.

R. Ali. To replicate reported analyses, datasets are available at https://osf.io/wuazq.

Disclosure

The findings herein reflect the work and are solely the responsibility of the authors.

Conflicts of Interest

The authors declare no conflicts of interest.

Funding

This publication was supported by NPRP 14 Cluster grant # NPRP 14C-0916–210015 from the Qatar National Research Fund (a member of Qatar Foundation).

Acknowledgments

We would like to thank Assoc. Prof. Seda Saraç (Bahçeşehir University, Turkey) and Assoc. Prof. Zeynep Tatlı (Trabzon University, Turkey) for their help with data collection in Turkey. During the preparation of this work, the authors used ChatGPT and Grammarly in order to improve language and grammar. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Supporting Information

Additional supporting information can be found online in the Supporting Information section.

Supporting Information 1. Data collection and procedure in each country (https://osf.io/wuazq).

Supporting Information 2. IADQ item-to-item and item-to-total correlations for each country (https://osf.io/wuazq).

Supporting Information 3. PYDQ item-to-item and item-to-total correlations for each country (https://osf.io/wuazq).

Supporting Information 4. Additional analyses, datasets, and data dictionary (https://osf.io/wuazq).

References

[1] International Telecommunication Union, "Statistics" 2023, https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

[2] H. C. Chen, J. Y. Wang, Y. L. Lin, and S. Y. Yang, "Association of Internet Addiction With Family Functionality, Depression, Self-Efficacy and Self-Esteem Among Early Adolescents," *International Journal of Environmental Research and Public Health* 17, no. 23 (2020): 8820, https://doi.org/10.3390/ijerph17238820.

[3] S. Jun and E. Choi, "Academic Stress and Internet Addiction From General Strain Theory Framework," *Computers in Human Behavior* 49 (2015): 282–287, https://doi.org/10.1016/j.chb.2015.03.001.

[4] C. H. Ko, J. Y. Yen, C. F. Yen, C. S. Chen, and C. C. Chen, "The Association Between Internet Addiction and Psychiatric Disorder: A Review of the Literature," *European Psychiatry: The Journal of the Association of European Psychiatrists* 27, no. 1 (2012): 1–8, https://doi.org/10.1016/j.eurpsy.2010.04.011.

[5] D. J. Kuss, M. Griffiths, L. Karila, and J. Billieux, "Internet Addiction: A Systematic Review of Epidemiological Research for the Last Decade," *Current Pharmaceutical Design* 20, no. 25 (2014): 4026–4052, https://doi.org/10.2174/13816128113199990617.

[6] A. Musetti, R. Cattivelli, M. Giacobbi, et al., "Challenges in Internet Addiction Disorder: Is a Diagnosis Feasible or Not?," *Frontiers in Psychology* 7 (2016): 842, https://doi.org/10.3389/fpsyg.2016.00842.

[7] K. T. Poon, "Unpacking the Mechanisms Underlying the Relation Between Ostracism and Internet Addiction," *Psychiatry Research* 270 (2018): 724–730, https://doi.org/10.1016/j.psychres.2018.10.056.

[8] K. S. Young, "Internet Addiction: The Emergence of a New Clinical Disorder," *Cyberpsychology & Behavior* 1, no. 3 (1998): 237–244, https://doi.org/10.1089/cpb.1998.1.237.

[9] R. Lozano-Blasco, A. Q. Robres, and A. S. Sánchez, "Internet Addiction in Young Adults: A Meta-Analysis and Systematic Review," *Computers in Human Behavior* 130 (2022): 107201, https://doi.org/10.1016/j.chb.2022.107201.

[10] Y.-C. Pan, Y.-C. Chiu, and Y.-H. Lin, "Systematic Review and Meta-Analysis of Epidemiology of Internet Addiction," *Neuroscience and Biobehavioral Reviews* 118 (2020): 612–622, https://doi.org/10.1016/j.neubiorev.2020.08.013.

[11] D. S. Bickham, "Current Research and Viewpoints on Internet Addiction in Adolescents," *Current Pediatrics Reports* 9, no. 1 (2021): 1–10, https://doi.org/10.1007/s40124-020-00236-3.

[12] C. Montag, K. Bey, P. Sha, et al., "Is It Meaningful to Distinguish Between Generalized and Specific Internet Addiction? Evidence From a Cross-Cultural Study From Germany, Sweden, Taiwan and China," *Asia-Pacific Psychiatry* 7, no. 1 (2015): 20–26, https://doi.org/10.1111/appy.12122.

[13] H. Pereira, G. Fehér, A. Tibold, G. Esgalhado, V. Costa, and S. Monteiro, "The Impact of Internet Addiction and Job Satisfaction on Mental Health Symptoms Among a Sample of Portuguese Workers," *International Journal of Environmental Research and Public Health* 18, no. 13 (2021): 6943, https://doi.org/10.3390/ijerph18136943.

[14] H. M. Pontes, A. Szabo, and M. D. Griffiths, "The Impact of Internet-Based Specific Activities on the Perceptions of Internet Addiction, Quality of Life, and Excessive Usage: A Cross-Sectional Study," *Addictive Behaviors Reports* 1 (2015): 19–25, https://doi.org/10.1016/j.abrep.2015.03.002.

[15] P. Wallace, "Internet Addiction Disorder and Youth: There Are Growing Concerns About Compulsive Online Activity and That This Could Impede Students' Performance and Social Lives," *EMBO Reports* 15, no. 1 (2014): 12–16, https://doi.org/10.1002/embr.201338222.

[16] F. Noroozi, S. Hassanipour, F. Eftekharian, K. Eisapareh, and M. H. Kaveh, "Internet Addiction Effect on Quality of Life: A Systematic Review and Meta-Analysis," *The Scientific World Journal* 2021 (2021): 12, 2556679, https://doi.org/10.1155/2021/2556679.

[17] H. Ding, B. Cao, and Q. Sun, "The Association Between Problematic Internet Use and Social Anxiety Within Adolescents and Young Adults: A Systematic Review and Meta-Analysis," *Frontiers in Public Health* 11 (2023): 1275723, https://doi.org/10.3389/fpubh.2023.1275723.

[18] M. L. Y. Chang and I. O. Lee, "Functional Connectivity Changes in the Brain of Adolescents With Internet Addiction: A Systematic Literature Review of Imaging Studies," *PLOS Mental Health* 1, no. 1 (2024): e0000022, https://doi.org/10.1371/journal.pmen.0000022.

[19] M. V. Martins, A. Formiga, C. Santos, et al., "Adolescent Internet Addiction - Role of Parental Control and Adolescent Behaviours," *International Journal of Pediatrics & Adolescent Medicine* 7, no. 3 (2020): 116–120, https://doi.org/10.1016/j.ijpam.2019.12.003.

[20] U. Bronfenbrenner, *The Ecology of Human Development* (Cambridge, MA: Harvard University Press, 1979), https://doi.org/10.4159/9780674028845.

[21] O. Mousa, S. Alshakhsi, A. Yankouskaya, C. Panourgia, and R. Ali, "Good Technology Requires a Good Environment: The Role of Parenting Practices in Adolescent Internet Addiction," in *GoodIT '24: Proceedings of the 2024 International Conference on Information Technology for Social Good* (Association for Computing Machinery, 2024), 143–150, https://doi.org/10.1145/3677525.3678654.

[22] J. Liu, L. Wu, X. Sun, X. Bai, and C. Duan, "Active Parental Mediation and Adolescent Problematic Internet Use: The Mediating Role of Parent-Child Relationships and Hiding Online Behavior," *Behavioral Sciences (Basel, Switzerland)* 13, no. 8 (2023): 679, https://doi.org/10.3390/bs13080679.

[23] S. Livingstone and E. J. Helsper, "Parental Mediation of Children's Internet Use," *Journal of Broadcasting & Electronic Media* 52, no. 4 (2008): 581–599, https://doi.org/10.1080/08838150802437396.

[24] C. Montag, Z. Demetrovics, J. D. Elhai, et al., "Problematic Social Media Use in Childhood and Adolescence," *Addictive Behaviors* 153 (2024): 107980, https://doi.org/10.1016/j.addbeh.2024.107980.

[25] A. Cohen, A. Bendelow, T. Smith, C. Cicchetti, M. M. Davis, and M. Heffernan, "Parental Attitudes on Social Media Monitoring for Youth: Cross-Sectional Survey Study," *JMIR Pediatrics and Parenting* 6 (2023): e46365, https://doi.org/10.2196/46365.

[26] J. Z. Wang, S. Zhao, C. Wu, et al., "Unlocking the Emotional World of Visual Media: An Overview of the Science, Research, and Impact of Understanding Emotion: Drawing Insights From Psychology, Engineering, and the Arts, This article provides a comprehensive overview of the field of emotion analysis in visual media and discusses the latest research, systems, challenges, ethical implications, and potential impact of artificial emotional intelligence on society," *Proceedings of the IEEE* 111, no. 10 (2023): 1236–1286, https://doi.org/10.1109/JPROC.2023.3273517.

[27] D. Kardefelt-Winther, "A Conceptual and Methodological Critique of Internet Addiction Research: Towards a Model of Compensatory Internet Use," *Computers in Human Behavior* 31 (2014): 351–354, https://doi.org/10.1016/j.chb.2013.10.059.

[28] E. P. Yim, "Effects of Asian Cultural Values on Parenting Style and Young Children's Perceived Competence: A Cross-Sectional Study," *Frontiers in Psychology* 13 (2022): 905093, https://doi.org/10.3389/fpsyg.2022.905093.

[29] N. A. Fineberg, J. M. Menchón, N. Hall, et al., "Advances in Problematic Usage of the Internet Research - A Narrative Review by Experts From the European Network for Problematic Usage of the Internet," *Comprehensive Psychiatry* 118 (2022): 152346, https://doi.org/10.1016/j.comppsych.2022.152346.

[30] D. Seguin, E. Kuenzel, J. B. Morton, and E. G. Duerden, "School's Out: Parenting Stress and Screen Time Use in School-Age Children During the COVID-19 Pandemic," *Journal of Affective Disorders Reports* 6 (2021): 100217, https://doi.org/10.1016/j.jadr.2021.100217.

[31] Y. Pan, D. Zhou, and D. T. L. Shek, "After-School Extracurricular Activities Participation and Depressive Symptoms in Chinese Early Adolescents: Moderating Effect of Gender and Family Economic Status," *International Journal of Environmental Research and Public Health* 19, no. 7 (2022): 4231, https://doi.org/10.3390/ijerph19074231.

[32] K. Chemnad, S. Alshakhsi, S. Al-Harahsheh, et al., "Is it Contagious? Does Parents' Internet Addiction Impact Their Adolescents' Internet Addiction?," *Social Science Computer Review* 41, no. 5 (2023): 1691–1711, https://doi.org/10.1177/08944393221117408.

[33] X. Zhu, C. Deng, and W. Bai, "Parental Control and Adolescent Internet Addiction: The Moderating Effect of Parent-Child Relationships," *Frontiers in Public Health* 11 (2023): 1190534, https://doi.org/10.3389/fpubh.2023.1190534.

[34] D. T. L. Shek, X. Zhu, and C. M. S. Ma, "The Influence of Parental Control and Parent-Child Relational Qualities on Adolescent Internet Addiction: A 3-Year Longitudinal Study in Hong Kong," *Frontiers in Psychology* 9 (2018): 642, https://doi.org/10.3389/fpsyg.2018.00642.

[35] M. Aziz, K. Chemnad, S. Al-Harahsheh, A. O. Abdelmoneium, A. Baghdady, and R. Ali, "Depression, Stress, and Anxiety Versus Internet Addiction in Early and Middle Adolescent Groups: The Mediating Roles of Family and School Environments," *BMC Psychology* 12, no. 1 (2024): 184, https://doi.org/10.1186/s40359-024-01659-z.

[36] K. Chemnad, M. Aziz, S. al-Harahsheh, A. O. Abdelmoneium, A. Baghdady, and R. Ali, "School Pressure and Academic Performance Versus Internet Addiction in Early and Middle Adolescents: The Mediating Role of Family Relationship," *Behaviour & Information Technology* (pp. 1–17, https://doi.org/10.1080/0144929X.2024.2396434.

[37] G. S. Chng, D. Li, A. K. Liau, and A. Khoo, "Moderating Effects of the Family Environment for Parental Mediation and Pathological Internet Use in Youths," *Cyberpsychology, Behavior and Social Networking* 18, no. 1 (2015): 30–36, https://doi.org/10.1089/cyber.2014.0368.

[38] R. Barr, "Parenting in the Digital Age," in *Handbook of Parenting: The Practice of Parenting*, ed. M. H. Bornstein (Routledge/Taylor & Francis Group, 2019), 380–409, https://doi.org/10.4324/9780429401695-13.

[39] S. M. Geurts, I. M. Koning, R. J. J. M. Van den Eijnden, and H. G. M. Vossen, "Predicting Adolescents' Problematic Social Media Use From Profiles of Internet-Specific Parenting Practices and General Parenting Dimensions," *Journal of Youth and Adolescence* 52, no. 9 (2023): 1829–1843, https://doi.org/10.1007/s10964-023-01816-4.

[40] A. Bleakley, M. Ellithorpe, and D. Romer, "The Role of Parents in Problematic Internet Use Among US Adolescents," *Media and Communication* 4, no. 3 (2016): 24–34, https://doi.org/10.17645/mac.v4i3.523.

[41] E. J. Lee and Y. Ogbolu, "Does Parental Control Work With Smartphone Addiction?: A Cross-Sectional Study of Children in South Korea," *Journal of Addictions Nursing* 29, no. 2 (2018): 128–138, https://doi.org/10.1097/JAN.0000000000000222.

[42] L. Chen, X. Liu, and H. Tang, "The Interactive Effects of Parental Mediation Strategies in Preventing Cyberbullying on Social Media," *Psychology Research and Behavior Management* 16 (2023): 1009–1022, https://doi.org/10.2147/PRBM.S386968.

[43] Q. Liu, Y. Lin, Z. Zhou, and W. Zhang, "Perceived Parent-Adolescent Communication and Pathological Internet Use Among Chinese adolescents: A Moderated Mediation Model," *Journal of Child and Family Studies* 28, no. 6 (2019): 1571–1580, https://doi.org/10.1007/s10826-019-01376-x.

[44] B. C. Y. Lo, R. N. M. Lai, T. K. Ng, and H. Wang, "Worry and Permissive Parenting in Association With the Development of Internet Addiction in Children," *International Journal of Environmental Research and Public Health* 17, no. 21 (2020): 7722, https://doi.org/10.3390/ijerph17217722.

[45] P. M. Valkenburg, J. T. Piotrowski, J. Hermanns, and R. de Leeuw, "Developing and Validating the Perceived Parental Media Mediation Scale: A Self-Determination Perspective," *Human Communication Research* 39, no. 4 (2013): 445–469, https://doi.org/10.1111/hcre.12010.

[46] R. A. Willems, P. K. Smith, C. Culbert, et al., "Internet Use and Perceived Parental Involvement Among Adolescents From Lower Socioeconomic Groups in Europe: An Exploration," *Children* 10, no. 11 (2023): 1780, https://doi.org/10.3390/children10111780.

[47] L. Kirwil, "Parental Mediation of Children's Internet Use in Different European Countries," *Journal of Children and Media* 3, no. 4 (2009): 394–409, https://doi.org/10.1080/17482790903233440.

[48] V. J. Rideout and M. B. Robb, *The Common Sense Census: Media Use by Tweens and Teens* (Common Sense Media, 2019), https://apo.org.au/node/58360.

[49] K. K. Mak, C. M. Lai, H. Watanabe, et al., "Epidemiology of Internet Behaviors and Addiction Among Adolescents in Six Asian Countries," *Cyberpsychology, Behavior and Social Networking* 17, no. 11 (2014): 720–728, https://doi.org/10.1089/cyber.2014.0139.

[50] P. Bouna-Pyrrou, B. Aufleger, S. Braun, et al., "Cross-Sectional and Longitudinal Evaluation of the Social Network Use Disorder and Internet Gaming Disorder Criteria," *Frontiers in Psychiatry* 9 (2018): 692, https://doi.org/10.3389/fpsyt.2018.00692.

[51] H. Jeong, H. W. Yim, S. Y. Lee, H. K. Lee, M. N. Potenza, and H. Lee, "Factors Associated With Severity, Incidence or Persistence of Internet Gaming Disorder in Children and Adolescents: A 2-Year Longitudinal Study," *Addiction (Abingdon, England)* 116, no. 7 (2021): 1828–1838, https://doi.org/10.1111/add.15366.

[52] S. J. Jo, H. W. Yim, H. Jeong, and H. K. Lee, "Moderating Effects of Depressive Symptoms and Self-Control Trait on the Association Between Problematic Internet Gaming and Time Spent," *Cyberpsychology, Behavior and Social Networking* 25, no. 4 (2022): 237–244, https://doi.org/10.1089/cyber.2021.0221.

[53] J. Burén, S. B. Nutley, and L. B. Thorell, "Screen Time and Addictive Use of Gaming and Social Media in Relation to Health Outcomes," *Frontiers in Psychology* 14 (2023): 1258784, https://doi.org/10.3389/fpsyg.2023.1258784.

[54] A. Fumero, R. J. Marrero, D. Voltes, and W. Peñate, "Personal and Social Factors Involved in Internet Addiction Among Adolescents: A Meta-Analysis," *Computers in Human Behavior* 86 (2018): 387–400, https://doi.org/10.1016/j.chb.2018.05.005.

[55] D. A. Gentile, H. Choo, A. Liau, et al., "Pathological Video Game Use Among Youths: A Two-Year Longitudinal Study," *Pediatrics* 127, no. 2 (2011): e319–e329, https://doi.org/10.1542/peds.2010-1353.

[56] C. Y. Wu, M. B. Lee, S. C. Liao, and L. R. Chang, "Risk Factors of Internet Addiction Among Internet Users: An Online Questionnaire Survey," *PLoS One* 10, no. 10 (2015): e0137506, https://doi.org/10.1371/journal.pone.0137506.

[57] M. Aziz, K. Chemnad, S. Al-Harahsheh, et al., "The Influence of Adolescents Essential and Non-Essential Use of Technology and Internet Addiction on Their Physical and Mental Fatigues," *Scientific Reports* 14, no. 1 (2024): 1745, https://doi.org/10.1038/s41598-024-51655-x.

[58] K. Chemnad, M. Aziz, S. Al-Harahsheh, et al., "Assessing the Relationship Between the Type of Internet Use and Internet Addiction in Early and Middle Adolescents: Cross-Sectional Study From Qatar," *JMIR Human Factors* 12 (2024): e62955, https://doi.org/10.2196/62955.

[59] A. K. Liau, A. Khoo, and P. H. Ang, "Parental Awareness and Monitoring of Adolescent Internet Use," *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues* 27, no. 4 (2008): 217–233, https://doi.org/10.1007/s12144-008-9038-6.

[60] Canadian Paediatric Society, Digital Health Task Force, Ottawa, Ontario, "Digital Media: Promoting Healthy Screen Use in School-Aged Children and Adolescents," *Paediatrics & Child Health* 24, no. 6 (2019): 402–408, https://doi.org/10.1093/pch/pxz095.

[61] E. H. Erikson, *Identity: Youth and Crisis* (W.W. Norton & Company, 1968).

[62] J. Piaget and M. Cook, *The Origins of Intelligence in Children* (International Universities Press, 1952), https://doi.org/10.1037/11494-000.

[63] A. Bandura, *Social Learning Theory* (Prentice-Hall, 1977).

[64] P. Nikken and J. Jansz, "Parental Mediation of Children's Videogame Playing: A Comparison of the Reports by Parents and Children," *Learning, Media and Technology* 31, no. 2 (2006): 181–202, https://doi.org/10.1080/17439880600756803.

[65] M. O. Lwin, A. Stanaland, and A. Miyazaki, "Protecting Children's Privacy Online: How Parental Mediation Strategies Affect Website Safeguard Effectiveness," *Journal of Retailing* 84, no. 2 (2008): 205–217, https://doi.org/10.1016/j.jretai.2008.04.004.

[66] M. Aziz, A. Erbad, S. Brahim Belhaouari, et al., "The Interplay Between Adolescents' Internet Addiction and Family-Related Factors: Three Common Patterns," *International Journal of Adolescence and Youth* 27, no. 1 (2022): 418–431, https://doi.org/10.1080/02673843.2022.2115307.

[67] H. J. Koo and J. H. Kwon, "Risk and Protective Factors of Internet Addiction: A Meta-Analysis of Empirical Studies in Korea," *Yonsei Medical Journal* 55, no. 6 (2014): 1691–1711, https://doi.org/10.3349/ymj.2014.55.6.1691.

[68] J. Xu, L. X. Shen, C. H. Yan, et al., "Parent-Adolescent Interaction and Risk of Adolescent Internet Addiction: A Population-Based Study in Shanghai," *BMC Psychiatry* 14 (2014): 112, https://doi.org/10.1186/1471-244X-14-112.

[69] M. Benton, "Evolution in Four Dimensions: Genetic, Epigenetic, Behavioral, and Symbolic Variation in the History Of

Life," *Journal of Clinical Investigation* 115, no. 11 (2005): 2961, https://doi.org/10.1172/JCI27017.

[70] D. L. Hartl and A. G. Clark, *Principles of Population Genetics* (Sinauer Associates, 2007).

[71] R. Plomin, J. C. DeFries, V. S. Knopik, and J. M. Neiderhiser, "Top 10 Replicated Findings From Behavioral Genetics," *Perspectives on Psychological Science: A Journal of the Association for Psychological Science* 11, no. 1 (2016): 3–23, https://doi.org/10.1177/1745691615617439.

[72] A. Bandura, "Social Cognitive Theory of Self-Regulation," *Organizational Behavior and Human Decision Processes* 50, no. 2 (1991): 248–287, https://doi.org/10.1016/0749-5978(91)90022-L.

[73] B. Bozoglan, "The Role of Family Factors in Internet Addiction Among Children and Adolescents: An Overview," in *Psychological, Social, and Cultural Aspects of Internet Addiction*, ed. B. Bozoglan (Information Science Reference/IGI Global, 2018), 146–168, https://doi.org/10.4018/978-1-5225-3477-8.ch008.

[74] K. Chemnad, M. Aziz, A. O. Abdelmoneium, et al., "Adolescents' Internet Addiction: Does It All Begin With Their Environment?," *Child and Adolescent Psychiatry and Mental Health* 17, no. 1 (2023): 87, https://doi.org/10.1186/s13034-023-00626-7.

[75] J. M. Vink, T. C. E. M. van Beijsterveldt, C. Huppertz, M. Bartels, and D. I. Boomsma, "Heritability of Compulsive Internet Use in Adolescents," *Addiction Biology* 21, no. 2 (2016): 460–468, https://doi.org/10.1111/adb.12218.

[76] U. Ozolins, S. Hale, X. Cheng, A. Hyatt, and P. Schofield, "Translation and Back-Translation Methodology in Health Research – A Critique," *Expert Review of Pharmacoeconomics & Outcomes Research* 20, no. 1 (2020): 69–77, https://doi.org/10.1080/14737167.2020.1734453.

[77] R. G. Kost and J. C. de Rosa, "Impact of Survey Length and Compensation on Validity, Reliability, and Sample Characteristics for Ultrashort-, Short-, and Long-Research Participant Perception Surveys," *Journal of Clinical and Translational Science* 2, no. 1 (2018): 31–37, https://doi.org/10.1017/cts.2018.18.

[78] X. Fan, B. C. Miller, K.-E. Park, et al., "An Exploratory Study About Inaccuracy and Invalidity in Adolescent Self-Report Surveys," *Field Methods* 18, no. 3 (2006): 223–244, https://doi.org/10.1177/152822X06289161.

[79] S. Kuitunen-Paul, A. Eichler, M. Wiedmann, L. A. Basedow, V. Roessner, and Y. Golub, "Comparing Self-Report and Parental Report of Psychopathologies in Adolescents With Substance Use Disorders," *European Child & Adolescent Psychiatry* 32, no. 2 (2023): 331–342, https://doi.org/10.1007/s00787-021-01865-9.

[80] K. Young, "Internet Addiction: Diagnosis and Treatment Considerations," *Journal of Contemporary Psychotherapy* 39, no. 4 (2009): 241–246, https://doi.org/10.1007/s10879-009-9120-x.

[81] American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Publishing, Inc., 4th edition, 1994).

[82] R. M. Ryan and E. L. Deci, *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness* (The Guilford Press, 2017), https://doi.org/10.1521/978.14625/28806.

[83] G. Hirschfeld and R. von Brachel, "Multiple-Group Confirmatory Factor Analysis in R – A Tutorial in Measurement Invariance With Continuous and Ordinal Indicators," *Practical Assessment, Research & Evaluation* 19, no. 1 (2014): 7, https://doi.org/10.7275/qazy-2946.

[84] G. W. Cheung and R. B. Rensvold, "Evaluating Goodness-of-Fit Indexes for Testing Measurement Invariance," *Structural Equation Modeling* 9, no. 2 (2002): 233–255, https://doi.org/10.1207/S15328007SEM0902_5.

[85] D. van den Bergh, E. J. Wagenmakers, and F. Aust, "Bayesian Repeated-Measures Analysis of Variance: An Updated Methodology Implemented in JASP," *Advances in Methods and Practices in Psychological Science* 6, no. 2 (2023): https://doi.org/10.1177/25152459231168024.

[86] B. M. Bolker, M. E. Brooks, C. J. Clark, et al., "Generalized Linear Mixed Models: A Practical Guide for Ecology and Evolution," *Trends in Ecology & Evolution* 24, no. 3 (2009): 127–135, https://doi.org/10.1016/j.tree.2008.10.008.

[87] R. Bono, R. Alarcón, and M. J. Blanca, "Report Quality of Generalized Linear Mixed Models in Psychology: A Systematic Review," *Frontiers in Psychology* 12 (2021): 666182, https://doi.org/10.3389/fpsyg.2021.666182.

[88] S. J. Cho, P. De Boeck, and W. Y. Lee, "Evaluating Testing, Profile Likelihood Confidence Interval Estimation, and Model Comparisons for Item Covariate Effects in Linear Logistic Test Models," *Applied Psychological Measurement* 41, no. 5 (2017): 353–371, https://doi.org/10.1177/0146621617692078.

[89] D. L. Putnick and M. H. Bornstein, "Measurement Invariance Conventions and Reporting: The State of the Art and Future Directions for Psychological Research," *Developmental Review* 41 (2016): 71–90, https://doi.org/10.1016/j.dr.2016.06.004.

[90] T. Bağatarhan, D. M. Siyez, and A. T. Vazsonyi, "Parenting and Internet Addiction Among Youth: The Mediating Role of Adolescent Self-Control," *Journal of Child and Family Studies* 32, no. 9 (2022): 2710–2720, https://doi.org/10.1007/s10826-022-02341-x.

[91] H. G. Kimball, F. Fernandez, K. A. Moskowitz, et al., "Parent-Perceived Benefits and Harms Associated With Internet Use by Adolescent Offspring," *JAMA Network Open* 6, no. 10 (2023): e2339851, https://doi.org/10.1001/jamanetworkopen.2023.39851.

[92] K. L. Derbyshire, K. A. Lust, L. R. Schreiber, et al., "Problematic Internet Use and Associated Risks in a College Sample," *Comprehensive Psychiatry* 54, no. 5 (2013): 415–422, https://doi.org/10.1016/j.comppsych.2012.11.003.

[93] Y. Kwak, H. Kim, and J. W. Ahn, "Impact of Internet Usage Time on Mental Health in Adolescents: Using the 14th Korea Youth Risk Behavior Web-Based Survey 2018," *PLoS One* 17, no. 3 (2022): e0264948, https://doi.org/10.1371/journal.pone.0264948.

[94] S. E. Hobfoll, "Conservation of Resources: A New Attempt at Conceptualizing Stress," *American Psychologist* 44, no. 3 (1989): 513–524, https://doi.org/10.1037/0003-066X.44.3.513.

[95] M. E. Seligman, "Learned Helplessness," *Annual Review of Medicine* 23, no. 1 (1972): 407–412, https://doi.org/10.1146/annurev.me.23.020172.002203.

[96] M. Bilge, G. Uçan, and H. Baydur, "Investigating the Association Between Adolescent Internet Addiction and Parental Attitudes," *International Journal of Public Health* 67 (2022): 1605065, https://doi.org/10.3389/ijph.2022.1605065.

[97] S. Livingstone, G. Mascheroni, and E. Staksrud, "European Research on Children's Internet Use: Assessing the Past

and Anticipating the Future," *New Media & Society* 20, no. 3 (2018): 1103–1122, https://doi.org/10.1177/1461444816685930.

[98] M. Akbari, M. Seydavi, S. Palmieri, G. Mansueto, G. Caselli, and M. M. Spada, "Fear of Missing Out (FoMO) and Internet Use: A Comprehensive Systematic Review and Meta-Analysis," *Journal of Behavioral Addictions* 10, no. 4 (2021): 879–900, https://doi.org/10.1556/2006.2021.00083.

[99] Children and Parents: Media use and Attitudes Report, "Ofcom: making communications work for everyone" 2016, https://www.ofcom.org.uk/siteassets/resources/documents/research-and-data/media-literacy-research/children/children-parents-nov16/children-parents-media-use-attitudes-report-2016.pdf?v=335496.

[100] M. Zhitomirsky-Geffet and M. Blau, "Cross-Generational Analysis of Predictive Factors of Addictive Behavior in Smartphone Usage," *Computers in Human Behavior* 64 (2016): 682–693, https://doi.org/10.1016/j.chb.2016.07.061.

[101] S. Tereshchenko and E. Kasparov, "Neurobiological Risk Factors for the Development of Internet Addiction in Adolescents," *Behavioral Sciences (Basel, Switzerland)* 9, no. 6 (2019): 62, https://doi.org/10.3390/bs9060062.

[102] L. Nower, W. L. Anthony, and J. F. Stanmyre, "The Intergenerational Transmission of Gambling and Other Addictive Behaviors: Implications of the Mediating Effects of Cross-Addiction Frequency and Problems," *Addictive Behaviors* 135 (2022): 107460, https://doi.org/10.1016/j.addbeh.2022.107460.

[103] K. Achuthan, S. Muthupalani, V. K. Kolil, and K. C. Madathil, "Theoretical Perspectives of Parental Influence on Adolescent Cyber Behaviour: A Bi-National Instagram-Based Study," *Heliyon* 8, no. 11 (2022): e11813, https://doi.org/10.1016/j.heliyon.2022.e11813.

[104] X. Niu, J. Y. Li, D. L. King, D. H. Rost, H. Z. Wang, and J. L. Wang, "The Relationship Between Parenting Styles and Adolescent Problematic Internet Use: A Three-Level Meta-Analysis," *Journal of Behavioral Addictions* 12, no. 3 (2023): 652–669, https://doi.org/10.1556/2006.2023.00043.

[105] A. Tsitsika, M. Janikian, T. M. Schoenmakers, et al., "Internet Addictive Behavior in Adolescence: A Cross-Sectional Study in Seven European Countries," *Cyberpsychology, Behavior and Social Networking* 17, no. 8 (2014): 528–535, https://doi.org/10.1089/cyber.2013.0382.

[106] M. Kilic, D. Avci, and T. Uzuncakmak, "Internet Addiction in High School Students in Turkey and Multivariate Analyses of the Underlying Factors," *Journal of Addictions Nursing* 27, no. 1 (2016): 39–46, https://doi.org/10.1097/JAN.0000000000000110.

[107] C. J. Sussman, J. M. Harper, J. L. Stahl, and P. Weigle, "Internet and Video Game Addictions: Diagnosis, Epidemiology, and Neurobiology," *Child and Adolescent Psychiatric Clinics of North America* 27, no. 2 (2018): 307–326, https://doi.org/10.1016/j.chc.2017.11.015.

[108] F. Vigna-Taglianti, R. Brambilla, B. Priotto, R. Angelino, G. Cuomo, and R. Diecidue, "Problematic Internet Use Among High School Students: Prevalence, Associated Factors and Gender Differences," *Psychiatry Research* 257 (2017): 163–171, https://doi.org/10.1016/j.psychres.2017.07.039.

[109] N. Parent, "Basic Need Satisfaction Through Social Media Engagement: A Developmental Framework for Understanding Adolescent Social Media Use," *Human Development* 67, no. 1 (2023): 1–17, https://doi.org/10.1159/000529449.

[110] J. S. Senekal, G. Ruth Groenewald, L. Wolfaardt, C. Jansen, and K. Williams, "Social Media and Adolescent Psychosocial Development: A Systematic Review," *South Africa Journal of Psychology* 53, no. 2 (2023): 157–171, https://doi.org/10.1177/00812463221119302.

[111] V. Franchina, M. Vanden Abeele, A. J. van Rooij, G. Lo Coco, and L. De Marez, "Fear of Missing Out as a Predictor of Problematic Social Media Use and Phubbing Behavior Among Flemish Adolescents," *International Journal of Environmental Research and Public Health* 15, no. 10 (2018): 2319, https://doi.org/10.3390/ijerph15102319.

[112] I. Granic, H. Morita, and H. Scholten, "Beyond Screen Time: Identity Development in the Digital Age," *Psychological Inquiry* 31, no. 3 (2020): 195–223, https://doi.org/10.1080/1047840X.2020.1820214.

[113] M. K. Underwood and S. E. Ehrenreich, "The Power and the Pain of Adolescents' Digital Communication: Cyber Victimization and the Perils of Lurking," *The American Psychologist* 72, no. 2 (2017): 144–158, https://doi.org/10.1037/a0040429.

[114] T. Siebers, I. Beyens, J. L. Pouwels, and P. M. Valkenburg, "Explaining Variation in Adolescents' Social Media-Related Distraction: The Role of Social Connectivity and Disconnectivity Factors," *Current Psychology* 42, no. 34 (2022): 29955–29968, https://doi.org/10.1007/s12144-022-03844-y.

[115] C. López, P. Hartmann, and V. Apaolaza, "Gratifications on Social Networking Sites: The Role of Secondary School Students' Individual Differences in Loneliness," *Journal of Educational Computing Research* 57, no. 1 (2019): 58–82, https://doi.org/10.1177/0735633117743917.

[116] Y. Guo, H. Y. Chen, X. You, X. Liu, X. Sun, and Y. Jin, "Relationship Between Parenting Style and Internet Addiction: Interpersonal Relationship Problem as a Mediator and Gender as a Moderator," *Heliyon* 10, no. 2 (2024): e23973, https://doi.org/10.1016/j.heliyon.2024.e23973.

[117] R. M. Costa, I. Patrão, and M. Machado, "Problematic Internet Use and Feelings of Loneliness," *International Journal of Psychiatry in Clinical Practice* 23, no. 2 (2019): 160–162, https://doi.org/10.1080/13651501.2018.1539180.

[118] T. Choi, J. W. Park, and D. J. Kim, "The Effect of Stress on Internet Game Addiction Trends in Adults: Mindfulness and Conscientiousness as Mediators," *Psychiatry Investigation* 18, no. 8 (2021): 779–788, https://doi.org/10.30773/pi.2020.0034.

[119] P. S. Brenner and J. DeLamater, "Lies, Damned Lies, and Survey Self-Reports? Identity as a Cause of Measurement Bias," *Social Psychology Quarterly* 79, no. 4 (2016): 333–354, https://doi.org/10.1177/0190272516628298.

[120] F. Angelini, C. Marino, and G. Gini, "Friendship Quality in Adolescence: The Role of Social Media Features, Online Social Support and E-motions," *Current Psychology* 42, no. 30 (2022): 26016–26032, https://doi.org/10.1007/s12144-022-03564-3.

[121] K. Tammisalo, M. Danielsbacka, A. O. Tanskanen, and B. Arpino, "Social Media Contact With Family Members and Happiness in Younger and Older Adults," *Computers in Human Behavior* 153 (2024): 108103, https://doi.org/10.1016/j.chb.2023.108103.

[122] A. De Los Reyes and A. E. Kazdin, "Informant Discrepancies in the Assessment of Childhood Psychopathology: A Critical Review, Theoretical Framework, and Recommendations for Further Study," *Psychological Bulletin* 131, no. 4 (2005): 483–509, https://doi.org/10.1037/0033-2909.131.4.483.

[123] P. Nikken and J. Jansz, "Developing Scales to Measure Parental Mediation of Young Children's Internet Use," *Learning,*

Media and Technology 39, no. 1 (2014): 250–266, https://doi.org/10.1080/17439884.2013.782038.

[124] F. F. Chen, "What Happens If We Compare Chopsticks With Forks? The Impact of Making Inappropriate Comparisons in Cross-Cultural Research," *Journal of Personality and Social Psychology* 95, no. 5 (2008): 1005–1018, https://doi.org/10.1037/a0013193.

[125] D. T. L. Shek, "The "ABCDE" of Video Gaming Control: Arguments, Basic Research, Conceptual Models, Documented Lessons, and Evaluation," *Journal of Behavioral Addictions* 8, no. 1 (2019): 3–6, https://doi.org/10.1556/2006.8.2019.13.

[126] K. Ding and H. Li, "Digital Addiction Intervention for Children and Adolescents: A Scoping Review," *International Journal of Environmental Research and Public Health* 20, no. 6 (2023): 4777, https://doi.org/10.3390/ijerph20064777.

[127] J. E. Lochman and A. van den Steenhoven, "Family-Based Approaches to Substance Abuse Prevention," *The Journal of Primary Prevention* 23, no. 1 (2002): 49–114, https://doi.org/10.1023/A:1016591216363.

[128] Y. Theopilus, A. Al Mahmud, H. Davis, and J. R. Octavia, "Digital Interventions for Combating Internet Addiction in Young Children: Qualitative Study of Parent and Therapist Perspectives," *JMIR Pediatrics and Parenting* 7, no. 1 (2024): e55364, https://doi.org/10.2196/55364.

[129] L. K. Chai, C. Collins, C. May, K. Brain, D. Wong See, and T. Burrows, "Effectiveness of Family-Based Weight Management Interventions for Children With Overweight and Obesity: An Umbrella Review," *JBI Database of Systematic Reviews and Implementation Reports* 17, no. 7 (2019): 1341–1427, https://doi.org/10.11124/JBISRIR-2017-003695.