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Association Between Parental Problematic Internet Use and Adolescent Depression

Shiri G. Raphaely[1] · Simon B. Goldberg[2,3] · Zachary N. Stowe[1] · Megan A. Moreno[4]

Abstract

We examined the association between parental problematic internet use (PIU) and adolescent depression and whether this association varied based on internet-related rules. We recruited adolescents ages 13–18 and their parent using national Qualtrics panels ($N = 4592$ dyads). Measures included the Problematic and Risky Internet Use Screening Scale (PRIUSS-3), the Patient Health Questionnaire (PHQ-9), and the internet specific parenting practice scale (ISPPS). Parental PIU was associated with symptoms of adolescent depression, including suicidal ideation, even when controlling for adolescent PIU ($\beta = 0.35$, 95% CI [0.32, 0.38]). Time-related rules moderated this association in a non-linear way where the association was strongest when time-related rules were unclear / mid-range. The moderation effect was linear for content-related rules, where stricter rules were associated with a weaker association between parent PIU and adolescent depression. Results support clinicians assessing parent PIU when treating depressed adolescents and engaging parents in monitoring their adolescents' internet use content.

Keywords Adolescent depression · Parenting · Problematic internet use · Internet specific parenting practices · Suicidal ideation

Introduction

Over the last 10 years, rates of adolescent depression have increased rapidly. In 2017, 13% of United States (US) adolescents experienced an episode of depression compared to 8% in 2007 [1]. The impact of the COVID-19 pandemic has accelerated this trend with a recent a meta-analysis of rates of youth depression globally showing a pooled prevalence of 25% [2]. A recent Centers for Disease Control and Prevention survey showed that 44% of American adolescents felt so sad and hopeless in the previous year that it impaired their functioning [3].

Almost as if in in parallel, the use of internet-based technologies has become increasingly pervasive in the lives of both adults and children over the last 10 years. The iPhone was released in 2007 and by 2018, 95% of teenagers aged 13–17 owned a smartphone and 45% said they are online "almost constantly" [4]. These trends have led to a hypothesized link between increased internet use and deteriorating adolescent mental health [5]. Generally, examination of this associations has focused on adolescent use in isolation. However, currently nearly all adults also own a smartphone, a third report being online almost constantly [6], and parents specifically are online over 9 h a day [7]. Given that the quality of the parent–child relationship is an important factor in the development of adolescent depression [8], it is critical to understand how the internet use behavior of this technologically-engaged generation of parents impacts their adolescent's mental health.

There is a robust literature demonstrating that *technoference* (i.e., the intrusion of technology into interpersonal interactions) between parents and younger children contributes to fewer parent–child interactions [9], lower

✉ Shiri G. Raphaely
  raphaely@wisc.edu

1 Department of Psychiatry, University of Wisconsin, 6001 Research Blvd, Madison, WI 53719, USA

2 Department of Counseling Psychology, University of Wisconsin, Education Building 1000 Bascom Mall, Rm 335, Madison, WI 53706, USA

3 Center for Healthy Minds, 625 West Washington Ave, Madison, WI 53703, USA

4 Department of Pediatrics, University of Wisconsin, 600 Highland Ave, Madison, WI 53792, USA

parental responsiveness [10], increased harshness of parental response [11], and emotional dysregulation on the part of both the parent and the child [12]. Another recent study showed that adolescents reported higher rates of depressive symptoms when parental smartphone use interfered with interactions [13]. On the other hand, there are parenting practices that are known to be protective, including parental monitoring of adolescent behaviors which are related to decreased high risk behavior, depression, and suicidal ideation [14]. Parental monitoring of adolescent online activities specifically is associated with decreased online high risk sexual behaviors [15] and harassment [16] as well as lower rates of adolescent internet addiction [17].

Given the significant influence of parental behavior on their children, it is critical to determine whether parental problematic internet use (PIU) specifically is associated with adolescent depressive symptoms including thoughts of suicide and self-harm. PIU is characterized by an inability to control internet use which, like addictive behaviors generally, results in negative consequences in daily life [18]. Past studies investigating parental technology use and adolescent mental health have focused primarily on social media use and technoference related to smartphone use [9–13, 19]. However, PIU compromises a wider set of activities that make up the 9 h a day that parents report spending online [7] that by the definition of PIU impacts daily life offline [18]. There is also a gap in understanding how specific internet-related parenting strategies may impact risk of adolescent depression in the context of parent PIU. Finally, studies on parenting often demonstrate discrepancies between adolescent and parent reports [20]. Research on parenting and internet use often only surveys parents or children, or asks different questions for each group [21]. There is thus a need for studies that assess both adolescent and parent perceptions of parenting practices that can inform approaches to clinical practice.

Current Study

This study addresses these gaps by assessing the association between parent PIU and adolescent depression and testing the moderating effect of internet-specific parenting rules with data from both parents and adolescents. This approach aims to increase our understanding of how parents' internet use may impact their adolescent's mental health, as well as provide further insight into how parenting practices may help protect adolescents from developing depression and suicidal thoughts. Findings from this study may ultimately contribute to guiding clinicians working with adolescents and their parents as technology use and its impact on families becomes an increasingly prevalent and clinically relevant concern [7].

Methods

Participants and Procedures

This cross-sectional online survey study utilized the Qualtrics platform survey panels for recruitment and survey hosting. The Institutional Review Board at the University of Wisconsin approved this study (2018–0781). Participants were recruited between February and March 2019. English speaking adult panel participants who had English speaking children between the age of 13–18 were recruited via text message and email. Qualtrics recruitment parameters were set to provide a nationally representative sample of US participants based on the US census from their adult panel and to ensure youth were no more than 55% for any gender. Adults who met criteria engaged in an informed consent process for themselves as well as their children (for additional details, see [22]).

After parents completed their portion of the survey, they were instructed to pass the device to their child. The adolescent was then provided study information and had the opportunity to provide assent to proceed. Adolescents were instructed to complete the survey in a private setting. All participants received nationwide mental health resources at the end of the survey. Participants received Qualtrics points as incentives for participation in the survey.

The sample size was planned based on power estimates for a latent class analysis (LCA), the results of which are published elsewhere [22]. LCA requires approximately 1:3–1:4 ratio of survey items to participants to achieve 0.80 power [23, 24]. After initially including 70 items in the LCA process, the sample size was increased to allow for investigation of differences in demographic factors such as adolescent age, gender, and race, and to account for incomplete surveys. Ultimately, 4,592 adolescent-parent dyads completed the surveys.

Measures

Patient Health Questionnaire—9 (PHQ-9; [25])

Adolescent participants completed the PHQ-9. The PHQ-9 is a 9-item depression self-rated screening scale and has been validated in both adults and adolescents. Questions assess specific depression symptoms in the past two weeks (e.g., "little interest or pleasure in doing things," "feeling down, depressed, or hopeless"). PHQ-9 item 9 assesses suicidal ideation and self-harm ("thoughts that you would be better off dead, or of hurting yourself in some way").

Response options are on a 5-point Likert-type scale ranging from 0 (*not at all*) to 4 (*nearly every day*) with higher scores indicating higher levels of depression symptoms. Standard cutoff values on the PHQ-9 are 5 (mild), 10 (moderate), 15 (moderately severe), and 20 (severe; [25]). Internal consistency reliability was high in the current study ($\alpha = 0.95$).

Problematic and Risky Internet Use Screening Survey (PRIUSS-3; [26])

Both adolescent and parent participants completed the PRI-USS-3 which is a validated 3-item scale assessing problematic and risky internet use. Adolescents and parents completed the measure in reference to their own internet use. The PRIUSS-3 is an abbreviated version of the 18-item PRIUSS [27, 28]. The PRIUSS has shown positive associations with patterns of technology use (e.g., posting on social media more than four times per day, [28]. Respondents indicate how often they experience anxiety and withdrawal when away from the internet and feel loss of motivation to do other things when on the internet (e.g., "How often do you experience increased social anxiety due to your internet use"). Response options are on a 5-point Likert-type scale ranging from 0 (*never*) through 4 (*always*) with higher scores indicating higher levels of PIU. The PRIUSS-3 has shown strong correlations ($r > 0.70$) with the 18-item PRIUSS [26]. A score greater than 3 indicates risk for PIU with a specificity of 0.69 and a sensitivity of 1.0 [26]. Internal consistency was high for both adolescent ($\alpha = 0.87$) and parent report ($\alpha = 0.88$).

Internet-Specific Parenting Practices Scale (ISPPS; [29])

Both adolescent and parent participants completed nine items from the *ISPPS* which assesses perception of the ways the parents regulate their adolescents' internet use (Van den [29]). Response options for all nine items are on a 5-point Likert-type scale. Six items evaluated rules regarding time spent on the internet (i.e., time-related rules). Two of these items assessed agreement with statements about parental rules (e.g., "My parents allow me to go on the internet as often as I want," "I allow my child to go on the internet as often as (s)he wants to") with response options ranging from 1 (*Absolutely not true*) to 5 (*Absolutely true*). These two items are reverse scored so that higher scores indicate more strict rules. The remaining four items in the time-related rules subscale assessed how often parents engage in various kinds of rule setting (e.g., "How often do your parents say that you aren't allowed to go on the internet," "How often do you say to your child that (s)he isn't allowed to go on the internet") with response options ranging from 1 (*Never*) to 5 (*Very often*). Three items evaluated rules regarding content of internet use (i.e., content-related rules). These items assessed agreement about parental rules (e.g., "My parents allow me to do whatever I like on the internet," "I allow my child to do whatever (s)he likes on the internet") with response options ranging from 1 (*Absolutely not true*) to 5 (*Absolutely true*). These three items are reverse scored so that higher scores indicate more strict rules. Internal consistency reliability was high for both the time-related rules subscale ($\alpha s = 0.85, 0.82$, for adolescent and parent report, respectively) and the content-related rules subscale ($\alpha s = 0.92, 0.91$, for adolescent and parent report, respectively).

Demographics

Demographic variables reported by parents included household income and parent gender identity and marital status. Adolescents reported age, gender identity, ethnicity as Hispanic/Latino or non-Hispanic Latino. Both parents and adolescents were asked to select all categories that described their race using US Census categories (White/Caucasian, Black/African American, Asian, American Indian/Native Hawaiian/Pacific Islander, multiracial and other).

Statistical Analyses

We used ordinary least squares regression to examine the association between parent PIU and adolescent depressive symptoms. All models covaried adolescent PIU as well as adolescent and parent demographics. A separate model examined the association between parent PIU with the suicidal ideation PHQ-9 item alone. Subsequent models added the interaction between parent PIU with each of the internet-related rules subscales of the ISPPS (time and content). Separate models evaluated results when internet-related rules were rated by parents or adolescents.

In order to investigate the possibility that the influence of internet-related rules on the parent PIU and adolescent depression link was non-linear, we examined the impact of adding quadratic versions of the internet-related rules variables. To aid in interpretation of moderation effects, we ran separate models examining the association between parent PIU and adolescent depression at varying levels of internet-related rules (i.e., time- or content-related rules). We examined associations when internet-related rules were less than one standard deviation below the mean (e.g., lenient time- or content-related rules), greater than one standard deviation above the mean (e.g., strict time- or content-related rules), or in between these values (e.g., moderate time- or content-related rules).

All analyses were conducted in the R statistical environment Version 4.2.0 [30]. Standardized effect sizes were

calculated using the 'lm.beta' function in the 'QuantPsyc' package [31] and by examining results when both the outcome and parent PIU were standardized. Effect sizes were interpreted based on Cohen's [32] guidelines ($\beta = 0.10$, 0.30, and 0.50 indicating small, medium, and large magnitude effects, respectively).

Results

Descriptive Statistics

Among the 4,592 adolescent-parent dyads who completed the surveys, adolescents had a mean age of 14.6 years (standard deviation [SD] = 1.43), 46.5% were female, and 66.9% were non-Hispanic White. For parents, 57.9% were female, 68.6% were non-Hispanic White, 74.1% lived in a household with an income above the poverty line, and 63.6% were married. Sample descriptive statistics are reported in Table 1.

The average adolescent PHQ-9 score was 5.47 ($SD = 6.93$), with 23.0% of adolescents scoring in the moderate or higher range (≥ 10) and 6.2% scoring in the severe range (≥ 20) of depressive symptoms [25]. A substantial minority (23.3%) reported some degree of suicidal ideation in the past week (i.e., > 0 on PHQ-9 item 9).

The average parent PRIUSS-3 score was 4.05 ($SD = 3.45$). Most parent participants met criteria for PIU, with 61.3% of parents scoring ≥ 3 on the PRIUSS-3. The average ISPSS scores for adolescent participants were 18.13 ($SD = 5.59$) and 10.64 ($SD = 3.72$), for time- and content-related rules, respectively. The average ISPSS scores for parent participants were 17.98 ($SD = 5.26$) and 10.65 ($SD = 3.63$), for time- and content-related rules, respectively. Parents and adolescents showed high agreement in their ratings of internet-related rules ($r = 0.81$ and 0.79, for time- and content-related rules, respectively).

Associations Between Parent PIU and Adolescent Depression

Parent PIU was positively associated with adolescent depression, with a moderate magnitude effect ($\beta = 0.35$, $p < 0.001$). Parent PIU was also positively associated with suicidal ideation (i.e., PHQ-9 item 9), with a moderate magnitude effect ($\beta = 0.38$, $p < 0.001$). As noted above, these and all other models covaried parent and adolescent demographics.

Both types of internet-related rules moderated the association between parent PIU and adolescent depression, regardless of whether internet-related rules were rated by parents or adolescents. The time-related rules by parent PIU interaction was positive and of similar magnitude when time-related rules were rated by parents (b = 0.030, $p < 0.001$) or adolescents (b = 0.037, $p < 0.001$). The interaction between

Table 1 Adolescent and Parent Demographics

Variable	n (%)
Adolescent Demographics	
Adolescent Age: Mean 14.62 (SD = 1.68)	
Adolescent Gender	
Female (cis and trans)	2135 (46.5%)
Male (cis and trans)	2417 (52.6%)
Other (non-binary)	23 (0.5%)
Prefer not to answer	17 (0.4%)
Adolescent Race	
White/Caucasian	3070 (66.9%)
Black/African American	699 (15.2%)
Native American/Alaskan Indian	152 (3.3%)
Asian	235 (5.1%)
LatinX	101 (2.2%)
Multiracial	221 (4.8%)
Other	31 (0.7%)
Prefer not to answer	82 (1.8%)
Parent Demographics	
Parent Gender	
Female (cis and trans)	2657 (57.9%)
Male (cis and trans)	1897 (41.3%)
Other (non-binary)	29 (0.6%)
Prefer not to answer	9 (0.2%)
Parent Race	
White/Caucasian	3148 (68.6%)
Black/African American	674 (14.7%)
Native American/Alaskan Indian	165 (3.6%)
Asian	254 (5.5%)
Latinx	97 (2.1%)
Multiracial	147 (3.2%)
Other	36 (0.8%)
Prefer not to answer	72 (1.6%)
Parent Income	
Below poverty line	1166 (25.4%)
Above poverty line	3402 (74.1%)
Prefer not to answer	24 (0.5%)
Parent Marital Status	
Married	2921 (63.6%)
Living with partner	440 (9.6%)
Divorced	389 (8.5%)
Separated	136 (3.0%)
Widowed	94 (2.0%)
Never married	568 (12.4%)
Prefer not to answer	44 (1.0%)

$N = 4592$ adolescent-parent dyads

a quadratic version of time-related rules and parent PIU was significant and of similar magnitude when time-related rules were rated by parents (b = − 0.0067, $p < 0.001$) or adolescents (b = − 0.0069, $p < 0.001$; Fig. 1).

Fig. 1 Time-Related Internet Rules Moderate the Association Between Parent Problematic Internet Use and Adolescent Depression. Moderation based on parent (top panel) or adolescent (bottom panel) ratings of time-related rules. Moderation is non-linear, with stronger links between parent problematic internet use and adolescent depression appearing when rules are less clear (i.e., neither low nor high levels of time-related rules). Low = less than one standard deviation below mean; moderate = one standard deviation below mean to one standard deviation above mean; high = greater than one standard deviation above mean
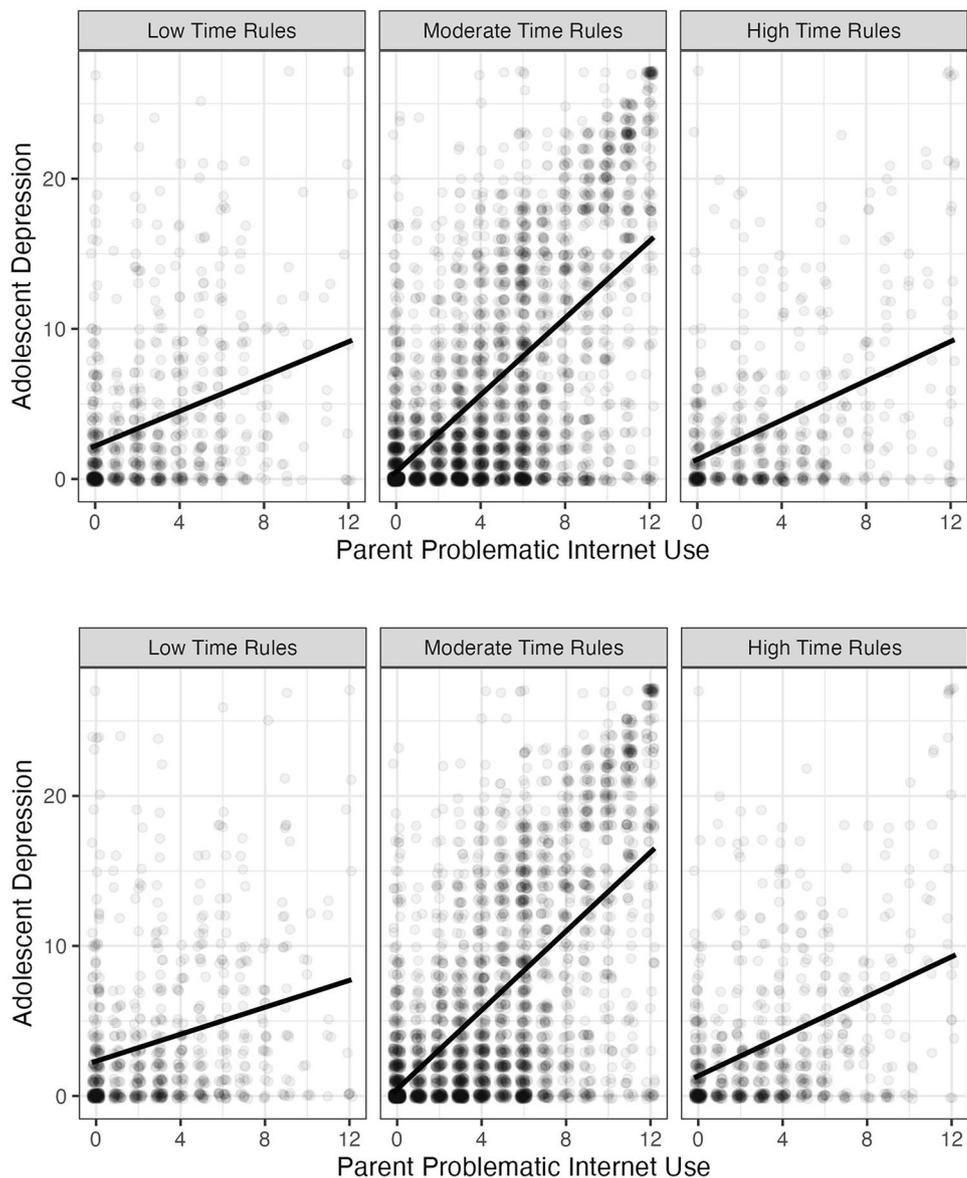
When time-related rules were lenient, the association between parent PIU and adolescent depression was weak (βs = 0.05 and − 0.01, ps = 0.206 and 0.772, when time-related rules rated by parents and adolescents, respectively). When time-related rules were moderate, the association between parent PIU and adolescent depression was larger (βs = 0.38 and 0.39, ps < 0.001, when time-related rules rated by parents and adolescents, respectively). When time-related rules were strict, the association was somewhat reduced (βs = 0.30 and 0.28, ps < 0.001, when time-related rules rated by parents and adolescents, respectively).

The content-related rules by parent PIU interaction was negative and of similar magnitude when content-related rules were rated by parents (b = − 0.079, p < 0.001) or adolescents (b = − 0.094, p < 0.001). In contrast to time-related rules, no interaction was detected between a quadratic version of content-related rules and parent PIU (bs = 0.0000076 and − 0.000095, ps = 0.997 and 0.568, when content-related rules rated by parents and adolescents, respectively; Fig. 2). When content-related rules were low, the association between parent PIU and adolescent depression was moderately large (βs = 0.29 and 0.37, ps < 0.001, when content-related rules rated by parents and adolescents, respectively). When content-related rules were moderate, the association was somewhat reduced (βs = 0.25 and 0.25, ps < 0.001, when content-related rules rated by parents and adolescents, respectively). When content-related rules were high, the association was yet further reduced (βs = 0.16 and 0.15, ps < 0.001, when content-related rules rated by parents and adolescents, respectively).

Fig. 2 Content-Related Internet Rules Moderate the Association Between Parent Problematic Internet Use and Adolescent Depression. Moderation based on parent (top panel) or adolescent (bottom panel) ratings of content-related rules. Moderation is linear, with stronger links between parent problematic internet use and adolescent depression appearing when content is less regulated. Low = less than one standard deviation below mean; moderate = one standard deviation below mean to one standard deviation above mean; high = greater than one standard deviation above mean
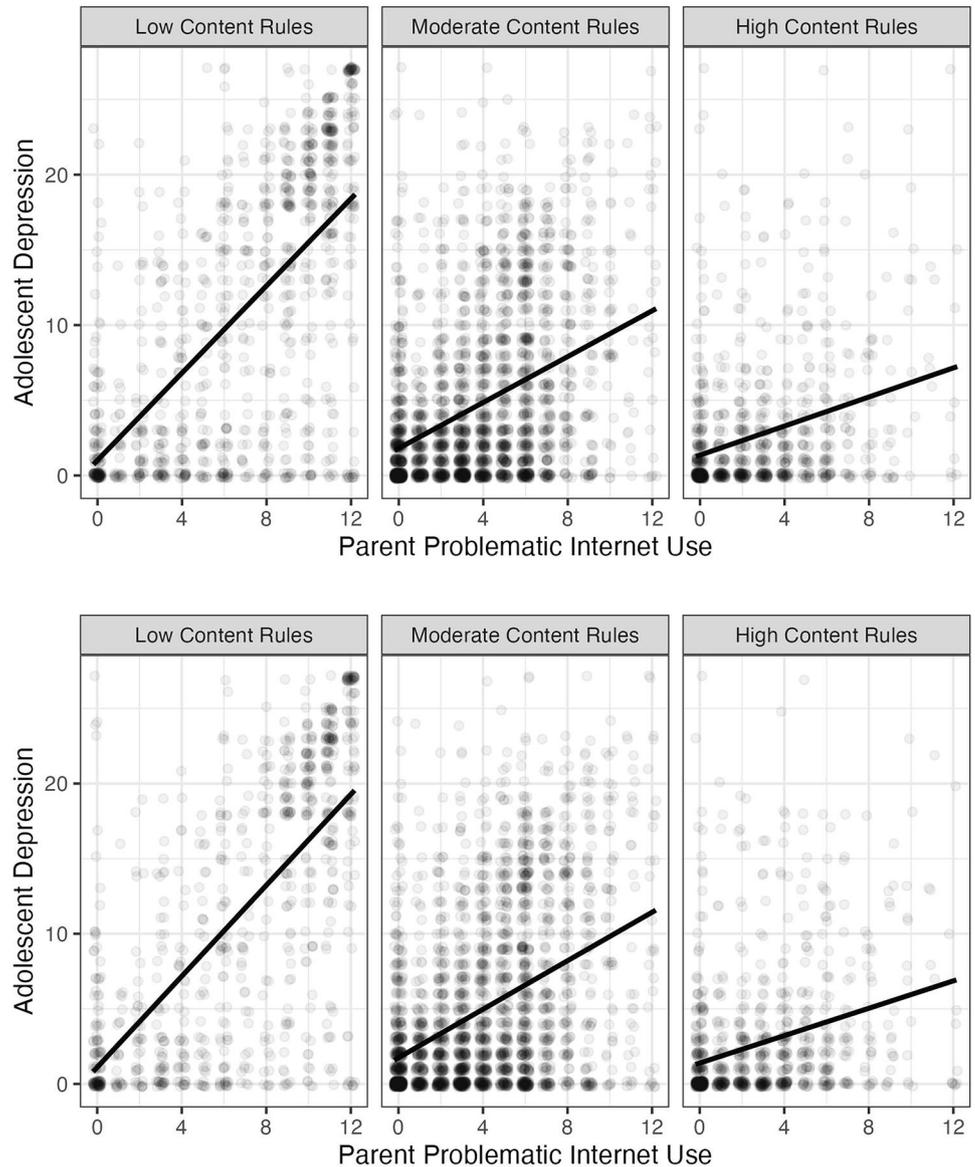
Discussion

As rates of adolescent depression rise, internet use has increasingly been identified as a potential contributor to this phenomenon in both the scientific literature and popular press [5]. The focus has largely been on children and adolescent internet use even though the risk of PIU now crosses over multiple generations in households [4],Perrin & Atske, 2022; [7]. This study investigated the association between parent PIU and adolescent depression symptoms. Further, we sought to clarify how internet specific parenting practices may moderate this association.

Our first finding was that parent PIU was robustly associated with adolescent depression symptoms, including suicidal ideation. Screening positive on the PRIUSS-3 indicates that one may experience negative physical and emotional symptoms (i.e., withdrawal) when away from internet access, as well as lack of motivation to do other activities [26]. Further, parental mobile device use negatively impacts communication, responsiveness, engagement and overall relationship quality between parents and their children [33], and parental absorption in digital media predicts attachment insecurity in young children [34]. Given that attachment insecurity confers risk for development of depression in adolescence, this may be a possible pathway through which parent PIU may impact adolescent depression [35]. Furthermore, it is unlikely that parent PIU occurs in isolation, but may exists alongside other parental factors that are known to confer risk for adolescent depression including parental depression, anxiety, and substance use [8, 36]. Further, parent PIU may also be an obstacle to parenting practices known to offer protection against adolescent depression

such as parental monitoring and clear communication [37]. It will be important to examine these various candidate pathways in future longitudinal studies. At this juncture, our findings support screening for PIU by pediatric mental health care providers in both parents and adolescents as a means to illuminate a potentially important aspect of parent–child dynamics that may impact adolescent mental health.

Our second set of findings centered on the role of internet-related rules regarding time and content as a moderator of the relationship between parent PIU and adolescent depression. Results indicated that the association between parent PIU and adolescent depression was smaller in households where rules on time were either more lenient or more strict, as rated by either the adolescent or the parent. It is notable, however, that analyses indicated a stronger association between parent PIU and adolescent depressive symptoms when both adolescents and parents stated that it was "neither true nor untrue" that parents allowed their adolescent to use the internet as long and as often as they wanted to. These findings may represent the contrast between a reactive parenting style, where rules are enforced only after a problem emerges thus making the exact rule somewhat unclear [38], versus the protective effects of clear communication and boundaries [14, 19]. Furthermore, this finding aligns with past research showing that the amount of time spent online as a single, continuous metric may a less significant factor for mental well-being [39]. Rather, it may be more important for to assess for quality of communication about time spent online between parents and adolescents rather than focusing solely on the amount of time itself.

Our findings on content-related rules were more straightforward, demonstrating that strict rules around content accessed on the internet attenuated the association between parent PIU and adolescent depression. These results align with previous research supporting the protective role of parental monitoring on adolescent depression in-person and online [14–17]. Parental monitoring describes the level of awareness and supervision that parents have around their children's behaviors when they are not directly with them, including communication directly between parent and child, as well as enforcing behaviors like only using phones or computers in family spaces [37]. Even in the context of parent PIU, it is possible that parental monitoring of online activity is protective both due to benefits associated with a more open and communicative parent–child relationship as well as reducing adolescents' online behaviors that increase mental health risk. Past research has shown that how adolescents engage with online content impacts their mental health [39]. For example, activities such as engaging in more violent and mature video games [40], passive scrolling [41], following celebrities on social media [42], or engaging in risky (i.e., more sexual or provocative) self-presentation [43] are all associated with depressive symptoms. Via mechanisms that warrant further investigation, parental monitoring may decrease engagement with these and other harmful activities.

Our study has several important limitations. First, we used a cross-sectional design which makes it impossible to infer cause and consequence. Second, as the study sample was recruited from an online platform, it may not be generalizable to a clinical population. Furthermore, given that 75% of the study population had household incomes above the poverty line, findings may not extend to clinical populations living in lower resource communities. Third, while a strength was the use of both parent and child data, measures were self-report and thereby subject to associated biases (e.g., recall bias, social desirability bias). Fourth, the PRIUSS-3 is a screening tool for PIU (e.g., feelings of anxiety or withdrawal), and thus does not capture the wide variety of ways individuals engage with the internet (e.g., passive scrolling vs. consuming educational content). Relatedly, the PHQ-9 is a screening tool and not diagnostic of depression, though it is very commonly used in clinical practice. A final important limitation was a lack of assessment of parents' level of depression. It is entirely possible that the link between parent PIU and adolescent depression is at least partially explained by a direct association between parental depression and adolescent depression, irrespective of parent PIU. It would be valuable for a future study to investigate directly whether parent PIU functions as a mediator of the link between parental depression and adolescent depression.

This study offers several avenues for future research. Longitudinal and experimental studies are warranted to help clarify potential causal linkages between parent PIU, internet-related rules, and adolescent depression. It will also be valuable to further elucidate the specific risk pathways that link parent PIU with adolescent depression to inform intervention efforts. Parenting behaviors and parent–child relationship factors (e.g., parental monitoring, attachment) may be key candidates to consider, as these factors may be impacted by PIU and have been shown to relate to child psychopathology [35, 36]). Multiple mediator models could be used in future studies to clarify various candidate causal pathways linking parental depression, parent PIU, parenting behaviors, and parent–child relationship factors with adolescent depression. Given evidence in the current study that content-related rules are potentially protective, more information is needed regarding what specific content confers higher risk for depression and what practices for parental monitoring are recommended. These findings would be enriched both by studies with more objective data (e.g., actual internet use patterns given concerns regarding the accuracy of self-reported use; [44]), measures that capture the different ways both parents and adolescents engage with the internet, and qualitative work to gain finer grained insight into the dynamics at play. Ultimately, studies that involve randomization, for example, randomizing parents to

receive interventions designed to decrease parents' PIU or to increase parents' implementation or internet-rules, may be necessary to unequivocally establish any causal impact of these parent-related factors on adolescent depression.

Summary

In summary, the current study adds to the growing literature seeking to improve adolescent mental health, diminish potential negative effects of internet use on adolescents, and provide clinically relevant guidance to parents and families. Our results suggest an association exists between parent PIU and adolescents' depression symptoms including adolescents' thoughts of suicide and self-harm, independent of their adolescent's internet use. At the same time, our results highlight parent-level factors that may modify the relationship between parents' internet use and adolescent depression, namely how parents convey and enforce rules about the internet. Findings support that parental oversight around content accessed online is protective and important to adolescents' mental health. Regarding time spent online, the clarity and consistency of time-related rules may be more important than the degree to which parents limit time online. As concern about adolescent depression increases and internet increasingly pervades the way individuals of all ages engage with the world, screening for parent PIU in clinical settings may be a potential way to engage parents in conversations about the relationship between their behaviors and their children's mental health.

Declarations

Conflict of Interest The authors declare no conflicts of interest.

Ethical Approval The Institutional Review Board at the University of Wisconsin approved this study.

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