


ORIGINAL ARTICLE

Parental psychological problems were associated with higher screen time and the use of mature-rated media in children

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Funding information

The study was supported by The Jenny and Antti Wihuri Foundation, Finland; The Yrjö Jahnsson Foundation, Finland; The Academy of Finland grant (decision number 310591 to CH) and the Academy of Finland's Invest Flagship Programme (decision number 320162). The funders played no role in the study or the paper

Abstract

Aim: Parents' psychological problems may affect children's screen time, but research has been scarce. We examined the association between parental psychological problems and children's screen media behaviours in a nationally representative sample.

Methods: The participants were from the Adolescent Brain Cognitive Development study, recruited by probability sampling from the USA population. Children reported their use of TV, videos, video games, social media and mature-rated media. The parents (85% mothers) reported psychological problems using the Adult Self-Report questionnaire.

Results: In 10,650 children (5112 girls, 5538 boys) aged 9.9 ± 0.6 years, the presence of parental psychological problems was associated with children spending more daily time on screen media and with meeting the recommendation of ≤ 2 daily hours less often than children whose parents did not have psychological problems. Parental psychological problems were associated with children's TV watching, video watching and gaming but not with using social media. Parental internalising problems were associated with children watching mature-rated movies (odds ratio [OR] = 1.14, 95% confidence interval [CI] = 1.00, 1.30) and playing mature-rated games (OR = 1.27, 95% CI = 1.11, 1.45).

Conclusion: Presence of parental psychological problems is associated with higher screen time and use of mature-rated media in children. This cross-sectional study was not able to examine causal associations.

KEYWORDS

children, mental health, parents, screen time, social media

1 | INTRODUCTION

School-age children spend large amounts of time in front of electronic screens including smartphones, games, computers and television.¹ Although screen time can have benefits for children's

well-being, such as enabling children to keep up social relationships when face-to-face contacts are limited,^{2,3} an increasing number of studies suggests that excessive screen time has negative effects on children's psychological and physical well-being. High screen time has been associated with low levels of physical activity, weight gain,

Abbreviations: ABCD, The Adolescent Brain Cognitive Development; CI, Confidence interval; OR, Odds ratio; TV, Television.

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depressive symptoms⁴⁻⁶ and with slower development of brain regions that regulate language development.^{7,8}

Parents play an important role in regulating children's screen time behaviours. Parents can influence what types of electronic screens are available at home, and how much children use them. Studies show that children spend less time on screen if their parents set limits and rules on their screen time,^{9,10} remove electronic devices from their bedrooms⁹ and watch media with their children.¹⁰ Positive parent-child relationships,¹¹ lower maternal stress¹² and parent's belief of being an effective parent¹³ have been associated with less screen time in children. In contrast, parental depression has been associated with more TV watching in small children,¹⁴ but whether and how parental mental health problems are related to children's multiple ways of using screens, including electronic games and social media, is not known. According to developmental theories, parents with mental health problems may have fewer resources to effectively deal with developmental challenges in their children.¹⁵ For instance, parents with mental health problems may have less psychological resources to monitor their children's behaviour, less resources to co-view screen media with their children, and fewer possibilities to offer alternative activities to children that could displace excess screen time.¹⁵ Previous literature also suggests that parental mental health problems could increase the likelihood of family conflicts,^{15,16} which, in turn, have been associated with more screen time in children.^{9,17}

In the current study, we examined if psychological problems in parents were associated with children's use of screen media. Psychological problems can be divided into externalising and internalising behaviour, which together reflect a wide range of psychiatric disorders in adults. The externalising spectrum reflects social maladjustment and dysregulation behaviours, whereas the internalising spectrum reflects inhibited or internally focused behaviours. Using a nationwide sample from the USA, we examined if the presence of parental externalising, internalising or total problems were associated with children's time spent on screen media and whether the associations were different for using TV, videos, games or social media. We also examined if parental psychological problems were associated with children's use of mature-rated media, referring to media involving depiction of violence, sexual themes, profanity, substances or other anxiety-provoking content. We examined family conflicts as potential explaining factors in the associations. The overarching goal of this study was to identify potentially modifiable parental psychological factors that should be targeted when planning family-based interventions aiming to promote healthier use of screen media in children.

2 | METHODS

2.1 | Participants

We used cross-sectional data from the Adolescent Brain Cognitive Development (ABCD) study, which comprises a representative sample of 11,875 children aged 9–10 years from the USA. The sample

Key Notes

- We examined the association between parental psychological problems and children's screen media behaviours in a nationally representative sample from the USA.
- Presence of parental psychological problems was associated with children spending more daily time on screen media and using more mature-rated media than children whose parents did not have psychological problems.
- Presence of parental psychological problems is associated with higher screen time and use of mature-rated media in children.

was recruited by probability sampling of public and private elementary schools within 21 study sites representing the entire country. During the participant enrolment phase, selected schools provided information packets about the study to all the invited families. Families were contacted by a researcher at the nearest university who determined whether a child was eligible. If so, families were contacted again to set up appointments and were provided instructions for what to expect and directions to the appointment. Detailed information pertaining to the dataset is available in reports on the data collection¹⁸ and at the ABCD study's website. Institution-specific research ethics boards approved all procedures, the procedures were compliant with the Declaration of Helsinki, caregivers provided written informed consent and children assented before participation in the study. Travel and incidental costs were compensated. We used cross-sectional baseline data collected in 2016–2018 ($N = 11,875$) released for researchers in 2019. We included 10,650 participants who had complete information on the study variables. Participants identified their ethnicity as Black ($n = 1480$), Asian ($n = 215$), White ($n = 5843$), Hispanic ($n = 1746$) and Multiracial ($n = 1366$).

2.2 | Measures

2.2.1 | Screen time behaviours

Screen time was assessed with 12 questions from the Youth Screen Time Survey¹⁸ developed by the ABCD study group. The questionnaire asks children to report the number of hours spent on a typical weekday and weekend day performing various recreational, non-educative, screen-based activities including television viewing, video watching (such as YouTube), playing online games, texting, visiting social networking sites (such as Twitter or Instagram), and using video chat (such as Facetime). Children rated the daily amount of using each media type using a 7-point scale: none, <30 min, 30 min, 1 h, 2 h, 3 h or ≥ 4 hours. Daily recreational screen time was calculated by taking a weighted average of weekday and weekend day minutes ($[\text{sum of weekday screen time in minutes} \times 5] + [\text{sum of weekend$

day screen time in minutes $\times 2$)/7. The hours spent using screen media were converted into minutes and summed together to form a total daily screen time variable (minutes per day). Guidelines^{19–21} recommend that school-aged children should accumulate no more than two hours of daily recreational screen time. Therefore, we also divided children into those who used ≤ 2 h per day and those who used > 2 h per day.

One question asked about the frequency of playing mature-rated video games, for example Call of Duty or Grand Theft Auto (never, sometimes, regularly and all the time) and another asked about the frequency of watching mature-rated movies (never, sometimes, regularly and all the time). The questions were converted into binary variables indicating whether the child used them never or at least sometimes.

2.2.2 | Parental psychological problems

The Adult Self-Report was used to examine the main caregivers' psychological problems.²² It is a standardised self-administered questionnaire to measure psychopathology with 123 items (eg 'I cry a lot'). The options are not true (0), somewhat or sometimes true (1) or very true or often true (2). The current study used broadband scales of externalising behaviour, internalising behaviour and total problems. These are based on specific Syndrome scales and Diagnostic and Statistical Manual V oriented problems scales. The externalising behaviour broadband scale includes statements from the intrusive, rule-breaking, aggressive, thought problems, hyperactivity and antisocial and inattention scales. The internalising behaviour scale includes statements from the somatic complaints, anxiousness, depressiveness, withdrawal and avoidant scales. The total problems scale sums up all statements from the questionnaire. Raw scores were converted into gender norm-based T-scores and participants were classified as not having a clinically significant problem (T-score < 65) or as having a clinically significant problem (T-score ≥ 65).²²

2.2.3 | Covariates

We adjusted the analyses for child's age, sex, ethnicity, family's annual income ($< \text{USD}5000$; 5000–11 199; 12 000–15 999; 16 000–24 999; 25 000–34 999; 35 000–49 999; 50 000–74 999; 75 000–99 999; 100 000–199 999; $\geq 200\ 000$) and the main caregiver (0 = mother, 1 = father or other). We also included presence of child psychological problem as a covariate, because children's internalising or externalising behaviours may affect their screen time.^{23,24} We used the Child Behaviour Checklist²⁵ where a $> 95^{\text{th}}$ percentile cut-off point indicated presence of borderline clinical problem on each scale. We additionally adjusted for family conflict assessed using the Family Conflict Subscale Modified from PhenX (9 items)²⁶ where a higher family conflict score indicates that there are more severe conflicts in the family.

2.3 | Data analyses

We used multilevel general linear models to examine if presence of parental psychological problems was associated with children's daily screen time, measured as minutes per day. Multilevel logistic regression models were used to examine if presence of parental psychological problems was associated with the binary outcome of children meeting versus not meeting the recommendation of two daily hours or less. Study site was used as the random intercept and the analyses were adjusted for child's age, sex, ethnicity, family income, the main caregiver (mother for 85% vs. other for 15%) and presence of child psychological problem (83% without and 17% with psychological problem) in the first step. In the second step, we additionally adjusted for family conflict score. To examine potential gender differences in the associations, interaction terms between the predictor variable and child's gender were entered into the models. We also compared children's daily minutes on screens in parents with and without psychological problems, which enabled to see how much more time children spent on screens if their parent had psychological problems.

General linear models were used to examine the association of parental psychological problems with children's time spent watching TV, watching videos, playing video games and using social media. Study site was the random intercept and the analyses were adjusted for the same covariates as above. Finally, we used logistic regression analyses to examine if presence of parental psychological problem was associated with children's use of mature-rated games (no/yes) or movies (no/yes). The analyses were conducted in RStudio 1.1.463.

3 | RESULTS

Table 1 shows that the children had 224 min of total daily screen time with boys having higher screen time than girls. Boys spent more time watching TV, watching videos and playing games, but girls spent more time on social media. The frequency distributions of the screen time variables are reported in Figure S1. The recommendation of using screens two hours or less per day was met by 36% of the children, with boys meeting it less often than girls (Table 1). Mature-rated media was used by 30% (movies) and 37% (games) of the children with boys using more often than girls. Regarding the parental variables, 9% of the parents had clinically significant externalising problems, 13% had internalising problems, and 4% had total problems. Of the sociodemographic variables, higher child's age, lower family income, male sex, being African American and child's own psychological problem were associated with lower odds for meeting the two-hour recommendation (Table S1).

Table 2 shows the associations of parental psychological problems with children's daily screen time. Presence of externalising or internalising problem in parents was associated with more minutes on screens per day and with a lower likelihood of meeting the screen time recommendation, although the effect sizes were small (Cohen's *d*s between 0.09 and 0.10). Adding family conflict as a covariate in

TABLE 1 Characteristics of the participants. The Adolescent Brain and Cognitive Development study

	All (n = 10650)		Girls (n = 5112)		Boys (n = 5538)		p-value
	Mean(SD)	n(%)	Mean(SD)	n(%)	Mean(SD)	n(%)	
Children's characteristics:							
Age	9.9(0.6)		9.9(0.6)		9.9(0.6)		>0.05
Watching TV (minutes/day)	75.2(62.1)		74.5(61.9)		75.7(62.3)		<0.05
Watching videos (minutes/day)	57.8(68.0)		52.5(65.5)		62.7(69.9)		<0.001
Playing games (minutes/day)	60.1(65.8)		39.6(52.6)		79.0(70.9)		<0.001
Social media (minutes/day)	30.8(66.14)		35.7(69.9)		26.2(62.1)		<0.001
Total screen time (minutes/day)	223.8(181.2)		202.2(175.3)		243.7(184.3)		<0.001
≤2 daily hours of screen time		3824(35.9)		2162(42.3)		1662(30.1)	<0.001
Watching mature-rated movies		3224(30.3)		1309(25.6)		1915(35.6)	<0.001
Playing mature-rated games		3883(36.5)		1087(21.3)		2796(50.5)	<0.001
Children with psychological problem		1778(16.7)		743(14.5)		1035(18.7)	<0.001
Parental characteristics:							
Presence of externalising problem		935(8.8)		434(8.5)		501(9.1)	>0.05
Presence of internalising problem		1425(13.4)		654(12.8)		771(13.9)	>0.05
Presence of total problem		446(4.2)		209(4.1)		237(4.3)	>0.05

the model led to an attenuation in the associations between parental externalising behaviour and both screen time outcomes.

Models with gender interaction terms showed a significant interaction term between parental total problems and child's gender ($p < 0.05$) in predicting daily minutes of screen time. There were, however, no significant associations between parental total problems and daily minutes of screen time in boys or girls separately (coefficients = -6.42 , $p = 0.592$ for girls and 21.71 , $p = 0.065$ for boys). There were no other significant gender interactions as reported in Table S2.

An additional *t* test analysis comparing children of parents with and without psychological problems (Table S3) showed that children whose parents had externalising problems spent 44 min more daily time on screens and children whose parents had internalising problems spent 50 min more daily time on screens compared to children whose parents did not have these problems.

Table 3 shows the results for children's use of different types of screen media. Parental externalising, internalising and total problems were associated with children spending more time with TV and videos. In addition, parental internalising problems were associated with children playing more video games. There was no change in the associations after adjusting for family conflicts. There were no significant associations between parental psychological problems and children's use of social media. The social media variable was, however, divided so that 43% of the children reported not using any social media. Therefore, we ran an additional logistic regression analysis where the outcome was a binary variable (not using vs. using social media). There was no association between parental psychological problems and the binary variable (p -values ranged from 0.201 to 0.786).

Adding gender interaction terms into the models showed a significant interaction term between parental total problems and child's gender ($p < 0.05$) for playing video games, but when the analyses

were run separately by gender, there were no significant associations in either gender (coefficients = -3.34 , $p = 0.380$ for girls, 3.53 , $p = 0.454$ for boys).

Table 4 shows that presence of parental internalising problem was associated with higher odds for watching mature-rated movies (OR 1.14, 95% CI 1.00–1.30) and for playing mature-rated games (OR 1.27, 95% CI 1.11–1.45) and the associations remained intact after adjusting for family conflicts. Adding gender interaction terms into the models showed no significant gender interactions (Table S2).

3.1 | Additional results

Because research suggests that very high use of screen media is risky,⁶ we conducted a *post hoc* analysis where we divided the children into high users (the highest 20%) and low/average users (lower 80%). Figure 1 shows that parental psychological problems were more often present in the high users than in the low/average users (12% vs. 8% for externalising problems, 19% vs. 12% for internalising problems and 7% vs. 4% for total problems). The results were similar regarding the other types of screen media (TV, videos and games) except social media, where there was no association (Table S4). Similarly, there were more psychological problems in parents of high users of mature-rated media than low/average users (Table S4).

4 | DISCUSSION

This cross-sectional observational study showed that parental psychological problems were associated with screen time behaviours in children living across the USA. Parents with externalising or internalising problems had children spending more time on screen media, equivalent to 45–50 min per day. Although the effect sizes were

TABLE 2 The association between parental psychological problems and children's screen time

Presence of parental psychological problem	Minutes per day ^b		Using ≤ 2 hours per day ^c	
	Coefficient	95% CI	OR	95% CI
Externalising behaviour ^a				
Model 1: basic adjustments	13.41*	1.83, 24.98	0.79**	0.67, 0.93
Model 2: +family conflict	9.61	-1.91, 21.12	0.81*	0.69, 0.96
Internalising behaviour ^a				
Model 1: basic adjustments	16.00**	6.10, 25.89	0.81**	0.71, 0.93
Model 2: +family conflict	14.46**	4.64, 24.29	0.82**	0.72, 0.95
Total problem behaviour ^a				
Model 1: basic adjustments	7.56	-8.91, 24.03	0.84	0.66, 1.07
Model 2: +family conflict	5.18	-11.17, 21.53	0.85	0.67, 1.09

Note: Model 1 adjusted for age, sex, ethnicity, family income, primary caregiver and presence of child's psychological problem.

* $p < 0.05$, ** $p < 0.01$.

^aReference group = parent does not have the problem.

^bMultilevel general linear model, coefficient = raw coefficient, CI = confidence interval

^cMultilevel logistic regression analysis, OR = Odds ratio.

TABLE 3 Results from multilevel general linear models showing the association between parental psychological problems and children's screen time (minutes per day) on different screen media activities.

Presence of parental Psychological problem	TV watching		Video/youtube		Video games		Social media	
	Coeff.	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Externalising behaviour ^a								
Model 1: basic adjustments	6.80**	2.60, 11.00	1.98**	1.51, 10.24	2.58	-1.66, 6.81	2.17	-2.25, 6.59
Model 2: +family conflict	6.09**	1.90, 10.29	0.59	-3.89, 5.07	1.36	-2.87, 5.59	1.65	-2.78, 6.09
Internalising behaviour ^a								
Model 1: basic adjustments	5.24**	1.65, 8.82	6.60**	2.76, 10.44	4.31*	0.68, 7.92	0.01	-3.80, 3.77
Model 2: +family conflict	4.87**	1.29, 8.45	6.11**	2.29, 9.93	3.82*	0.21, 7.43	-0.22	-4.00, 3.57
Total problem behaviour ^a								
Model 1: basic adjustments	8.61**	2.64, 14.58	0.98	-5.42, 7.38	0.07	-6.10, 5.96	-1.54	-7.83, 4.76
Model 2: +family conflict	8.31**	2.36, 14.26	0.01	-6.35, 6.36	-0.91	-6.91, 5.10	-1.83	-8.13, 4.46

Note: Model 1 adjusted for age, sex, ethnicity, income, primary caregiver and presence of child's psychological problem.

Abbreviations: Coeff, Coefficient; OR, Odds ratio; CI, Confidence interval.

* $p < 0.05$, ** $p < 0.01$.

^aReference group = parent does not have the problem.

TABLE 4 Odds ratios and 95% confidence intervals (CI) for using mature-rated media according to parental psychological problems

Presence of parental psychological problem	Mature-rated movies ^b		Mature-rated games ^b	
	OR	95% CI	OR	95% CI
Externalising behaviour ^a				
Model 1: basic adjustments	1.14	0.98, 1.33	1.09	0.93, 1.28
Model 2: +family conflict	1.10	0.94, 1.28	1.06	0.91, 1.25
Internalising behaviour ^a				
Model 1: basic adjustments	1.14*	1.00, 1.30	1.27**	1.11, 1.45
Model 2: +family conflict	1.12*	1.00, 1.28	1.25**	1.10, 1.43
Total problem behaviour ^a				
Model 1: basic adjustments	1.10	0.89, 1.36	1.28*	1.03, 1.60
Model 2: +family conflict	1.07	0.87, 1.33	1.26	1.01, 1.57

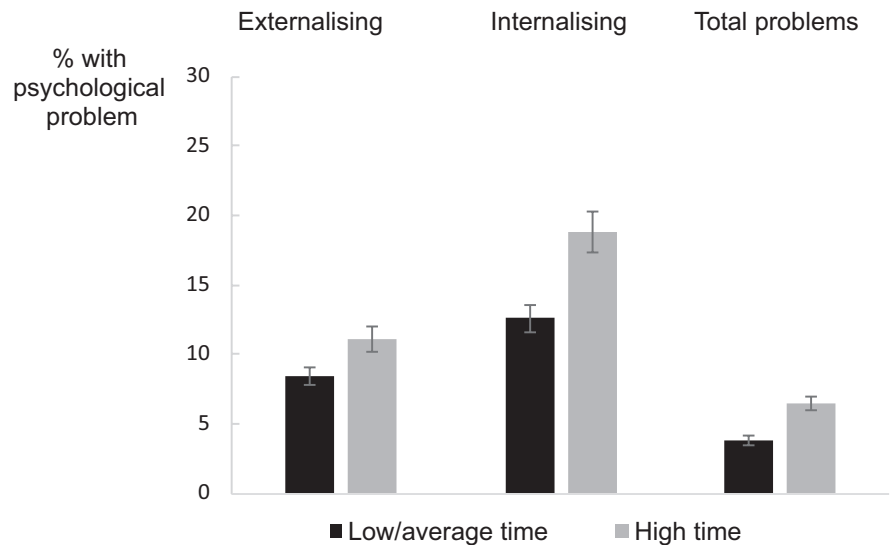
Note: Adjusted for age, sex, ethnicity, family income, main caregiver and presence of child's psychological problem.

* $p < 0.05$, ** $p < 0.01$.

^aReference group = parent does not have the problem.

^bUsing at least sometimes (vs. never using).

FIGURE 1 Percentages of parents having externalising, internalising or total problems in children spending low/average (lower 80%) versus high (top 20%) daily time on screens



rather small, this study extends previous knowledge by suggesting that parental psychological problems have a role in children's screen media behaviours.

It was found that parental psychological problems had associations with children's TV and video watching, and to some extent with playing video games, but not with social media use. This is a new finding in the literature. Our findings may be understood from a framework suggesting that different screen-based activities may have different underlying factors.³ Both TV and video watching are passive ways of using screen media, where the recipient passively receives information without interacting with the media or creating content. Recent studies have shown that passive forms of screen time behaviours are associated with adverse health-effects.^{27,28} In contrast, using social media and gaming can be viewed as more active ways of using media, because they often, although not always, involve participation such as playing with others, production of material or exchanging messages. Research on the health-effects of active media is inconclusive, but some studies suggest that active use of screen media is better for health than passive use.²⁸ It should, however, be noted that 43% of the children in our sample did not use any social media, which likely reflects the fact that the age limit for registering to social media sites is 13–16 years. Because the children in our sample were aged 10 years, the lack of an association between parental psychological problems and social media use should be confirmed in other samples with a more appropriate age range.

When asked about the consumption of mature-rated media, children whose parents had internalising problems reported watching mature-rated movies and playing mature-rated games more often than children whose parents had no psychological problems. To understand these findings, it may be useful to remind that externalising problems include overt behaviours such as aggression, hyperactivity and antisocial behaviours, while internalising problems are inward-directed behaviours such as depressiveness, somatic feelings or anxiety. Although the effect sizes were small to modest, this finding contributes to the understanding of how

children use media, instead of focussing only on time spent on screens. Our findings suggest that if parents have internalising problems, children are more disposed to using media contents that involve violence, sexual behaviours, substance use or other adult-related content.

For interventions and preventions, it would be important to identify the mediating factors that connect parental psychological problems with children's screen time. There is reason to assume that parenting behaviours are one potential mechanism. Previous literature suggests that parental mental health problems could increase the likelihood of family conflicts,^{15,16} which, in turn, have been associated with more screen time in children.^{9,17} We did not build mediation models, but we examined family conflict as a covariate in the analyses and found that family conflicts contributed specifically to the associations between parental externalising behaviours and children's screen time. One interpretation of this finding is that parents with externalising behaviours are likely to create family conflicts, thereby pushing children towards screen media (for instance, to escape the situation). This direction of causality is feasible given that externalising behaviours include aggressive behaviours and behaviours that often transgress the rights of other people. Reverse causality is also possible, meaning that excessive screen time in children creates family conflicts and externalising behaviours. Studies have also shown that children spend less time on screen if their parents set limits and rules on their screen time^{9,10} and watch media with their children.¹⁰ We suggest that future studies should examine different parenting behaviours as mediating mechanisms potentially linking parental mental health with children's screen time behaviours.

4.1 | Strengths and limitations

A strength of our study was the nationally representative sample, validated questionnaires on psychological health and the possibility to examine multiple types of screen time behaviours. We are

not aware of previous studies that have examined the association between parental psychological problems and multiple screen time behaviours in children. We were also able to adjust for children's psychological problems, thus ruling out the possibility that the associations would reflect children's psychological problems rather than those of their parents. In studies including family members, common-rater variance is a typical problem if parents assess their own behaviour and that of their child. In our study, we were able to rule out common-rater variance because the parents rated their own psychological problems and the children rated their own screen time.

The most significant limitation was the cross-sectional study design, owing to which we could not identify causal directions. Neither could we rule out the possibility of residual confounding by biological factors such as shared genetic inheritance between parents and children. The lack of an association between parental total problems and children's screen time may be explained by the heterogeneous nature of the measurement scale. The total problems scale is a composite score reflecting externalising and internalising symptoms. When different, and even opposite, types of symptoms are combined in the same scale, the scale may not be associated with the same outcomes as its subscales. There were also several limitations pertaining to the measurement of screen time. First, measures of screen time were based on children's self-reports, which are subject to biases such as difficulty of tracking time. People generally underestimate their time spent on screens and it is possible that children used screens longer than they reported. However, the amounts found in our study correspond rather well to national results from the same year: the children in our study had slightly less than 4 h of daily screen time, while national reports have shown 4 h 44 min.¹ A limitation is that we did not measure concurrent use of multiple screens, which is common especially in adolescents.²⁹ Finally, it is unclear how much screen time is disadvantageous for health. A maximum of two daily hours is recommended by some health organisations while others do not recommend specific limits. We attempted to accommodate different views by examining screen time as a dichotomous outcome and as a continuous variable, both of which showed similar findings.

5 | CONCLUSION

In conclusion, this study suggests that parental psychological problems are associated with children spending more time with screens and with using potentially healthier contents. Although the effect sizes in this study were modest, we suggest that parents' mental health should be considered as one possible contributor to children's screen time behaviours.

ACKNOWLEDGEMENTS

Data used in the preparation of this article were obtained from the Adolescent Brain Cognitive DevelopmentSM (ABCD) Study (<https://abcdstudy.org>), held in the NIMH Data Archive (NDA). This is a

multisite, longitudinal study designed to recruit more than 10,000 children age 9-10 and follow them over 10 years into early adulthood. The ABCD Study® is supported by the National Institutes of Health and additional federal partners under award numbers U01DA041048, U01DA050989, U01DA051016, U01DA041022, U01DA051018, U01DA051037, U01DA050987, U01DA041174, U01DA041106, U01DA041117, U01DA041028, U01DA041134, U01DA050988, U01DA051039, U01DA041156, U01DA041025, U01DA041120, U01DA051038, U01DA041148, U01DA041093, U01DA041089, U24DA041123, U24DA041147. A full list of supporters is available at <https://abcdstudy.org/federal-partners.html>. A listing of participating sites and a complete listing of the study investigators can be found at https://abcdstudy.org/consortium_members/. ABCD consortium investigators designed and implemented the study and/or provided data but did not necessarily participate in the analysis or writing of this report. This manuscript reflects the views of the authors and may not reflect the opinions or views of the NIH or ABCD consortium investigators. The ABCD data repository grows and changes over time. The ABCD data used in this report came from 10.15154/1524631.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

How to cite this article: Pulkki-Råback L, Barnes JD, Elovainio M, et al. Parental psychological problems were associated with higher screen time and the use of mature-rated media in children. *Acta Paediatr.* 2022;111:825-833. doi:[10.1111/apa.16253](https://doi.org/10.1111/apa.16253)