Parent Technology Use, Parent–Child Interaction, Child Screen Time, and Child Psychosocial Problems among Disadvantaged Families

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Objective To disentangle the pathways of parent technology use, parent–child interactions, child screen time, and child psychosocial difficulties among disadvantaged families in Hong Kong.

Study design Parents of 1254 3-year-old children from the KeySteps@JC project reported on the number of hours their children used electronic devices every day and evaluated their children's psychosocial behaviors using the Strengths and Difficulties Questionnaire. These parents also reported on their own digital device usage patterns and the frequency of parent–child interactions and provided sociodemographic data. Structural models were tested with parent technology use (independent variable), parent technological distractions and parent–child interactions and child screen time (mediators), child psychosocial problems (dependent variable), and children's age and sex and family socioeconomic status index (confounding variables).

Results Parent distraction with technology during parent–child interactions completely mediated the overall association between parent problematic digital technology use and child screen use duration. Parent problematic digital technology use was positively and directly associated with child psychosocial difficulties. In addition, it was indirectly related to child psychosocial difficulties through technological distractions and reductions in parent–child interactions and increased media use by children.

Conclusion Higher parent digital technology usage was associated with reduced parent–child interactions and increased child screen time and psychosocial difficulties in disadvantaged families. These results suggest that limiting parents' use of electronic devices in front of their young children could be beneficial for childhood psychosocial development. *(J Pediatr 2020;226:258-65)*.

Advances in mobile and digital technology have changed communication and interactions between parents and children. This development has raised concerns about the consequences of growing use of electronic devices on child development and parent–child interaction.[1] Emerging evidence ties parents' overuse of technology to children's behavioral problems, which typically encompass internalizing and externalizing symptoms. A large body of research has illustrated the potency of learning through observation and social modeling.[2,3] Children watching television together with their parents every day were found to have a 1.84-fold greater chance of excessive television viewing.[4] Although evidence supports the association between parental screen time and child screen time, the underlying mechanism for this remains unclear.

A possible mechanism linking parental screen time and child screen time is through a phenomenon known as "technology interference" or "technoference."[5] Parents who frequently use electronic devices may spend less time on screen-free family activities, such as field trips and parent–child conversations.[6] These parents are also more easily absorbed with and affected by electronic devices. Prolonged screen use may reduce parental warmth and responsiveness toward their children.[7] Technoference in parent–child activities—distracted parenting—refers to the sudden withdrawal of parental attention due to the distraction from a device.[8] The resulting suspension of the parent–child interaction may convey to a young child that screen activities are most important and should take precedence over all other activities; this could have a negative effect on their subsequent perceptions and behavior regarding screen use. Furthermore, the child may be left alone to play with mobile devices or watch television for extended periods when the parent

CFI	Comparative fit index
CPCIS	Chinese Parent-Child Interaction Scale
DPS	Distracted Parenting Scale
PDTU	Problematic Digital Technology Use
RMSEA	Root mean square error of approximation
SDQ	Strength and Difficulties Questionnaire
SRMR	Standardized root mean square residual
SES	Socioeconomic status
TLI	Tucker-Lewis fit index

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Funded by the Hong Kong Jockey Club Charities Trust. The authors declare no conflicts of interest.

https://doi.org/10.1016/j.jpeds.2020.07.006

is absorbed with the devices and thus less attentive to the child.[9] Excessive screen use in early childhood may have serious consequences for health and development. Problematic maternal and paternal technology use can lead to increased externalizing and internalizing behaviors in children through interference of technology in parent–child interactions.[10] Technoference in parent–child activities also has been found to correlate with parenting stress[8] and harsh responses to child misbehavior.[6]

As a result of the increasing pace of technology advancements, children have access to digital and mobile devices from a very young age.[11-13] Studies have demonstrated a surge in media use, in terms of both time and access, among young children.[14,15] There is a dose–response relationship between overall screen time and internalizing symptoms (eg, depressive symptoms, suicidal feelings).[16-18] On the other hand, displacement theory posits that exciting and attention-catching features of technology may increase externalizing symptoms (eg, attention and impulsivity) by disengaging children from learning opportunities that are valuable for their cognitive development, health, and well-being.[19,20]

Furthermore, there is evidence of disparity in child screen use across family socioeconomic classes. Children from lower socioeconomic families in Hong Kong are more likely to overuse electronic devices,[21] lack quality interactions with parents,[22] and exhibit problem behavior.[22] In Western countries, children from underprivileged families also report longer screen time.[23,24] It seems plausible that parental screen time may be a determinant of child behavioral problems in these families. Thus, the aim of the present study was to test whether distracted parent–child activities would mediate the association between parent problematic mobile technology use and child screen time. We also examined the associations among parent technology use, parent–child interactions, child screen time, and child psychosocial difficulties in a group of disadvantaged families in Hong Kong.

Methods

The study sample comprised parent–child dyads from the KeySteps@JC project, a 5-year intervention project aiming to use an integrated service and support program involving medical, education, and welfare sectors to build stronger foundations for children from disadvantaged backgrounds in Hong Kong. The project began in 2017 and involved 32 local kindergartens in 2 underprivileged districts of Hong Kong. All students in K1 (first year) of these kindergartens and their families were eligible to participate in the project. Detailed information about KeySteps@JC is available online (http://www.keysteps.hk). Ethical approval for the study was obtained from the Institutional Review Board of Hong Kong University and Hospital Authority Hong Kong West Cluster (reference no. UW 17-491).

Among the 1608 families providing consent to participate, we analyzed the baseline survey data of 1254 children (mean age 3.42 ± 0.35 years; 54.5% females) and their parents (mainly mothers) who had completed questionnaires on parental and child screen use, parenting, and child psychosocial behavior. The monthly average household income was HK$28 100 (US$ 3512.5), which is lower than the 2018 Hong Kong population median monthly 3-member household income estimate of HK$32 700.[25] Compared with families not included in our analyses owing to missing questionnaire data, the families in our analytic sample were from a higher socioeconomic background [$t(1384) = -1.99$; $P = .047$]; the samples were otherwise similar in terms of sociodemographic characteristics, parental screen use behavior, and child screen time and psychosocial difficulties.

Measures

Problematic Parent Mobile Technology Use. We translated the Problematic Digital Technology Use (PDTU) scale, which assesses the extent to which parents are preoccupied by their mobile phone,[10] into Chinese and revised it to be more contextually appropriate. The PDTU contains 3 items that measure parent mobile phone use on a 6-point scale ranging from 0 (strongly disagree) to 5 (strongly agree). An overall score (mean, 1.98 ± 1.12) was produced by averaging the items. Higher scores indicate more problematic mobile phone use ($\alpha = 0.80$).

Interruptions in Parent–Child Interactions due to Digital and Mobile Technology. Parents completed the Distracted Parenting Scale (DPS), which was adapted from the Technoference in Parent-Child Relationships Scale.[10] The DPS measures the frequency of interference by electronic devices during parent–child conversations or activities on a 6-point scale from 0 (none) to 5 (more than 20 times), with higher scores indicating more frequent technological distractions. The scale was translated into Chinese ($\alpha = 0.77$). Because its distribution was positively skewed (skewness, 1.66), a square root transformation was performed to generate more normally distributed scores for analysis (skewness, 0.09).

The Chinese Parent-Child Interaction Scale (CPCIS) was used to assess the weekly frequency of the following parent–child activities: reading, drawing, singing, storytelling, discussing news and current affairs, and learning arithmetic/mathematics, English alphabet, and Chinese characters.[26] Items were rated on a 3-point scale, ranging from 0 (none) to 3 (4 times or above per week), and averaged to generate an overall mean score (mean, 1.64 ± 0.59), with higher scores representing more frequent parent–child interactions ($\alpha = 0.82$).

Child Screen Time. Children's daily screen time, measured in hours (mean, 3.19 ± 2.70 hours), was calculated by averaging the amount of screen time reported for weekends and weekdays using the weighted average formula ([2 × weekend + 5 ×

Table I. Subject characteristics (N = 1254)

Characteristics	Value
Child characteristics	
Age, y, mean (SD)	3.42 (0.35)
Sex, n (%)	
Male	570 (45.5)
Female	684 (54.4)
Time spent using electronic devices, h/d, mean (SD)	3.19 (2.70)
SDQ Total Difficulties score (range, 0-40), mean (SD)	12.10 (4.80)
Parent characteristics	
Mother	
Education, n (%)	
Lower secondary	358 (28.5)
Upper secondary	486 (38.8)
Postsecondary	225 (17.9)
Undergraduate	174 (13.9)
Missing	11 (0.9)
Job, n (%)	
Full-time	394 (31.4)
Part-time	138 (11.0)
Job seeking	36 (2.9)
Housewife	675 (53.8)
Missing	11 (0.9)
Father	
Education, n (%)	
Lower secondary	343 (27.4)
Upper secondary	529 (42.2)
Postsecondary	175 (14.0)
Undergraduate	180 (14.4)
Missing	27 (2.2)
Job, n (%)	
Full-time	1074 (85.6)
Part-time	49 (3.9)
Job seeking	54 (4.3)
Househusband	35 (2.8)
Missing	42 (3.3)
Monthly household income (HKD '000), mean (SD)	28.1 (18.7)
Comprehensive Social Security Assistance, n (%)	
Yes	115 (9.2)
No	1127 (89.9)
Missing	12 (1.0)
Family SES, mean (SD)	0.03 (1.28)
PDTU score (range 0-5), mean (SD)	1.98 (1.12)
CPCIS score (range 0-3), mean (SD)	1.64 (0.59)
DPS score (range 0-5), mean (SD)	0.64 (0.54)

weekday] ÷ 7). As with the DPS scores, data on children's screen time were positively skewed (skewness, 1.48) and required normalization by a square-root transformation for analysis (skewness, 0.36).

Table II. Correlations among all variables entered into the path model

Study variables	1	2	3	4	5	6	7
1. Child age	-	-	-	-	-	-	-
2. Child sex (1, male; 0, female)	*−0.01*	-	-	-	-	-	-
3. Family SES	−0.05	*0.02*	-	-	-	-	-
4. SDQ Total Difficulties score	−0.02	*0.13**	−0.06†	-	-	-	-
5. PDTU score	0.02	*−0.007*	0.02	0.12*	-	-	-
6. CPCIS score	−0.03	*0.03*	0.08*	−0.16*	−0.09*	-	-
7. DPS score	0.02	*−0.004*	−0.04	0.15*	0.36*	−0.08*	-
8. Children's screen time	0.05	*0.03*	−0.08*	0.14*	0.09*	−0.04	0.25*

Spearman coefficients are in italic type.
*$P < .01$.
†$P < .05$.

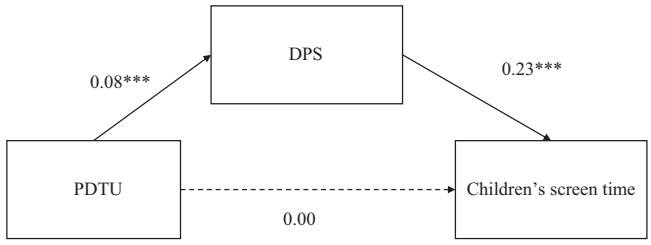

Figure 1. Model of PDTU predicting the DPS that finally predicts children's screen time. Standardized estimates are reported. Child sex and age and family SES were also controlled in the model. The total effect of PDTU on children's screen time was significant (estimate: 0.02; 95% CI, 0.01-0.03; $P = .003$), as was the indirect effect through DPS (estimate: 0.02; 95% CI, 0.01-0.03; $P < .001$). *$P < .05$; **$P < .01$; ***$P < .001$. Nonsignificant paths are shown with dotted arrows. All remaining paths are significant.

Children's Psychosocial Difficulties. Parents also completed the Strength and Difficulties Questionnaire (SDQ),[27] comprising 25 items assessing conduct problems, hyperactivity, emotional problems, peer problems, and prosocial behavior. The Chinese version of SDQ has been widely used in previous local preschooler studies.[28] The conduct problems (eg, often fights with other children) and hyperactivity (eg, restless, overactive, cannot stay still for long) scales were summed to derive an externalizing score, whereas the emotional (eg, many fears, easily scared) and peer problems (eg, has at least 1 good friend) were summed to generate an internalizing score. Furthermore, a total difficulties score (mean 12.10 ± 4.80) was computed by summing the 4 problem behavior scale scores ($\alpha = 0.74$); 6.9% of the cases were considered "highly difficult" using the cutoff score (SDQ Total Difficulties score >19) recommended for the Hong Kong population.[29]

Sociodemographic Data. Parents reported their education attainment, employment status, monthly household income, and receipt of Comprehensive Social Security Assistance. Using principal component analysis with varimax rotation,[30] maternal and paternal education, maternal and paternal occupation, and adjusted monthly household income were aggregated into a family socioeconomic status (SES) index. Children's age and sex and family SES index were considered potential confounding variables in this study.

Statistical Analyses. Data analyses were carried out using SPSS version 25 (IBM, Armonk, New York) and R version 3.5.0 (R Foundation for Statistical Computing, Vienna, Austria) in 4 steps. First, descriptive statistics (mean ± SD for continuous variables and frequency and percentage for categorical variables) were computed to describe the sociodemographic and family characteristics of the participants, as well as their SDQ total difficulties

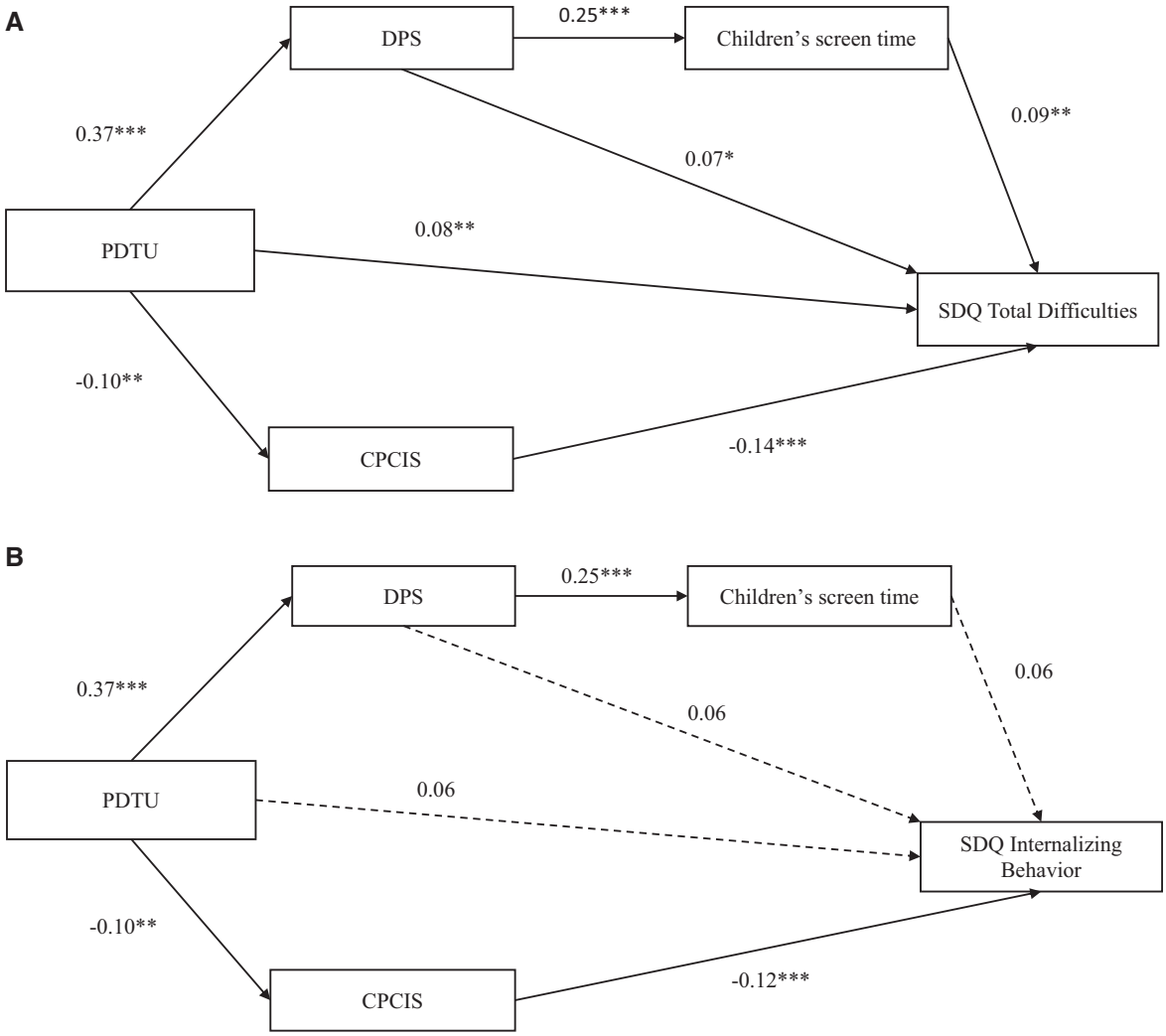

Figure 2. **A,** Path analysis testing the influence of parent problematic digital and mobile technology use on parent–child interaction and children's screen time and psychosocial difficulties. Standardized estimates are reported. Child sex and age and family SES were also controlled for in the model. *$P < .05$; **$P < .01$; ***$P < .001$. Fit indices: $\chi^2 = 1.28$; df = 3; $P > .05$; CFI = 1.000; TLI = 1.037; RMSEA = 0.000; SRMR = 0.005. **B,** Path analysis testing the influence of parent problematic digital and mobile technology use on parent–child interaction and children's screen time and internalizing behavior. Standardized estimates are reported. Child sex and age and family SES were also for controlled in the model. *$P < .05$; **$P < .01$; ***$P < .001$. Fit indices: $\chi^2 = 1.28$; df = 3; $P > .05$; CFI = 1.00; TLI = 1.04; RMSEA = 0.00; SRMR = 0.005. Nonsignificant paths are shown with dotted arrows. All remaining paths are significant. **C**, Path analysis testing the influence of parent problematic digital and mobile technology use on parent–child interaction and children's screen time and externalizing behavior. Standardized estimates are reported. Child sex and age and family SES were also controlled for in the model. *$P < .05$; **$P < .01$; ***$P < .001$; $\chi^2 = 1.28$; df = 3; $P > .05$; CFI = 1.00; TLI = 1.04; RMSEA = 0.00; SRMR = 0.005. Nonsignificant paths are shown with dotted arrows. All remaining paths are significant. *(Continues)*

score and amount of time spent using electronic devices and their parents' PDTU, CPCIS, and DPS scores. Second, bivariate correlations were used to examine the strength of association among the variables entered into the model. Third, to examine the mediating role of DPS score in the association between PDTU score and child screen time, the indirect effect of DPS score and its 95% CI were estimated through a bias-corrected confidence interval bootstrap test using 5000 replications of the original sample.[31,32] Fourth, the proposed path model containing parent PDTU score (independent variable), parent DPS and CPCIS scores and child screen time (mediators), child SDQ Total Difficulties score (dependent variable), and child's age and sex and family SES index (confounding variables) was tested using structural equation modeling techniques provided by the R package *lavaan*, which allows for the simultaneous examination of direct and indirect effects.[33] Although there were no missing values for the independent, mediating, and dependent variables, family SES index had 9.33% missing data. To account for missing data in the analyses, the path models were fitted using maximum likelihood methods.[34] Standardized regression

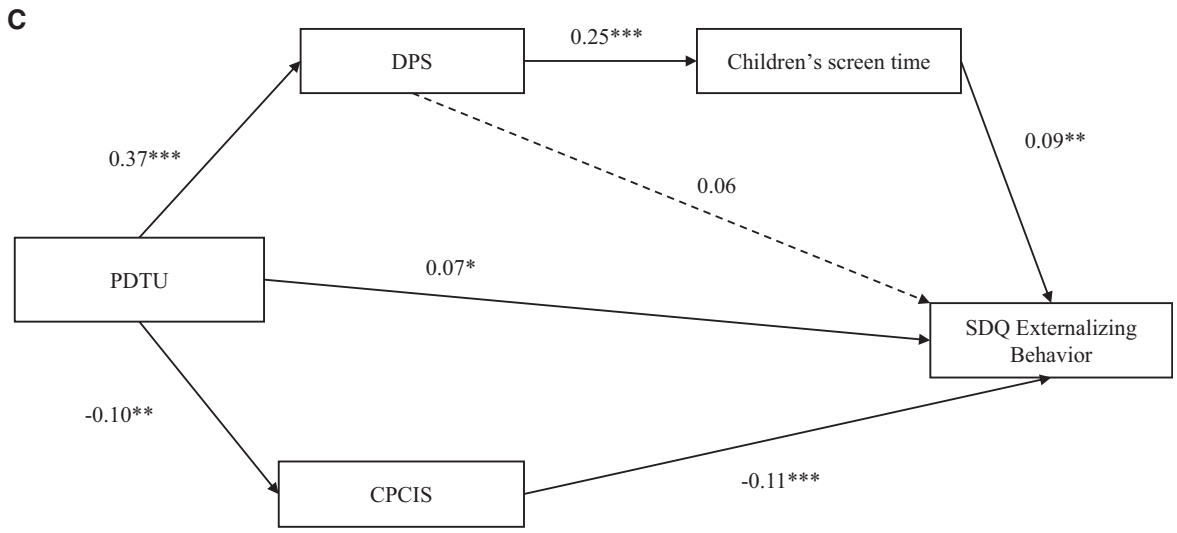

Figure 2. Continued.

(beta) weights were generated to examine the size, with P values < 0.05 indicating statistical significance. Goodness-of-fit indices used to examine overall model fit included χ^2 statistics, with $P > .05$ indicating a good fit; the comparative fit index (CFI) and the Tucker-Lewis fit (TLI), with values >0.95 indicating an excellent fit; standardized root mean square residual (SRMR), with values <0.05 indicating an excellent fit[35]; and root mean square error of approximation (RMSEA), with values ≤0.01 indicating an excellent fit.[36]

Results

Descriptive statistics for study variables are displayed in Table I. Children spent an average of 3 hours on electronic devices each day. More than 90% of the parents reported that digital and mobile technology devices had interrupted their interactions with their children at least once daily. However, the mean PDTU and DPS scores were 1.98 and 0.64, indicating that majority of the parents perceived few or no problems with their screen use behavior and were seldom distracted by devices during parent–child interactions. Table II shows the correlations among the PDTU, CPCIS, SDQ Total Difficulties, and DPS scores and child screen time and the sociodemographic characteristics of children.

Distracted Parent–Child Activities Would Mediate the Association Between Parent Problematic Mobile Technology Use and Child Screen Time

The mediation analysis was conducted to evaluate the role of DPS score in mediating the association between parent PDTU score and child screen time. The results showed no direct effect, but the total and indirect effects were statistically significant (Figure 1). This indicates that the interruptions caused by digital and mobile devices during parent–child interactions fully accounted for the association between parent problematic use of mobile technology and child screen time.

The Model Linking Parent Problematic Technology Use, Parent–Child Interactions, Distracted Parenting Behavior, Child Screen Time, and Child Psychosocial Difficulties Would be Significant

Figure 2, A shows the path model linking parent PDTU score and child SDQ Total Difficulties score. The model shows an excellent fit to the data: χ^2 (3) = 1.28; P not significant; CFI = 1.00; TLI = 1.04; RMSEA = 0.00; SRMR = 0.01. The PDTU scores were positively related to DPS score (standardized β = 0.37; $P < .001$), CPCIS score (standardized $\beta = -0.10$; $P < .01$), and SDQ Total Difficulties score (standardized β = 0.08; $P < .01$). There were also positive associations between the DPS scores and child screen time (standardized β = 0.25; $P < .001$) and SDQ Total Difficulties scores (standardized β = 0.07; $P < .05$). Higher SDQ Total Difficulties scores were related to lower CPCIS scores (standardized $\beta = -0.14$; $P < .001$) and longer child screen time (standardized $\beta = 0.09$; $P < .01$).

We also examined whether the paths would be different in the models for internalizing and externalizing behavior, respectively. The results showed that the models fit the data well for internalizing ($\chi^2_{(3)}$ = 1.28; P not significant; CFI = 1.00; TLI = 1.04; RMSEA = 0.00; SRMR = 0.005) (Figure 2, B) and externalizing behavior ($\chi^2_{(3)}$ = 1.28; P not significant; CFI = 1.00; TLI = 1.04; RMSEA = 0.00; SRMR = 0.005) (Figure 2, C). Specifically, higher parent PDTU scores were related to lower CPCIS scores (standardized $\beta = -0.10$; $P < .001$). Moreover, higher CPCIS scores were related to lower SDQ Internalizing (standardized $\beta = -0.12$; $P < .001$) and Externalizing Behavior score (standardized $\beta = -0.11$; $P < .001$). On the other hand, higher parent PDTU scores were related to

higher DPS scores (standardized $\beta = 0.37$; $P < .001$), and higher DPS scores were related to increased child screen time (standardized $\beta = 0.25$; $P < .001$). Finally, longer screen time was related to higher SDQ Externalizing Behavior scores in young children (standardized $\beta = 0.09$; $P < .01$).

Discussion

This study examined the pathways underlying the associations between parents' problematic mobile technology use and young children's screen use and psychosocial problems in a large cohort of families from a low-SES background living in Hong Kong. It provides evidence of increased screen time in children with parents often busy on their phones and the mediating role of parenting factors and children's screen time in explaining the relationship between parents' problematic mobile technology use and children's psychosocial problems. Technological distractions during parent–child interactions fully mediated the association between parent problematic mobile technology use and children's screen time. Furthermore, technological interruptions to parenting behaviors and children's screen time together accounted for the association between parent's problematic mobile technology use and children's psychosocial difficulties. Children's externalizing behavior was directly and indirectly related to parents' problematic mobile technology use through reduced parent–child interactions, technological distractions in parent–child interactions, and increased child screen time. Conversely, parents' problematic mobile technology use was related to children's internalizing behavior only indirectly through reduced parent–child interactions.

We found that parents being distracted by devices in front of children is an important step in the process linking parent technology use and children's screen time. We also observed that parents who are dependent on mobile devices may engage in screen use behavior more frequently during parent–child interactions. Through modeling, children may learn and perform the same screen use behavior subsequently. The finding supports the hypothesis that children's screen use behavior can be learned from their parents and echoes the tenet of the social cognitive theory that stresses the importance of observation and modeling in the learning process.[2] In addition, it should be noted that parents in this study reported a relatively low level of problematic mobile technology use behavior and distracted parenting behavior. Although the occurrence was infrequent, their correlations with children's screen time were significant and positive, suggesting that parents' use of devices in front of children, even in occasional sessions, may facilitate children's acquisition of screen use behavior. The average screen time among children in this study has exceeded the 1-hour daily screen use limit recommended by the World Health Organization for children aged 2-4 years.[37]

We also found that children of parents with a higher level of dependency on mobile devices had more psychosocial difficulties. It has been reported that parents who are absorbed with technology are less likely to interact with their children.[38] Technologically distracted parents are also less attentive, sensitive, and responsive to their children, which may prompt children to engage in disruptive behavior as an attempt to recapture parental attention.[1] Furthermore, exposure to bad language or negative affects during parents' media use may increase children's risk of improper social expectations and behaviors later in life.[39] Parental displays of negative affect during parent–child interactions can elevate anxiety and fear in children, impede a positive parent–child relationship, and impair children's ability to regulate behaviors through inhibitory control.[40] Contrary to previous findings purporting that longer screen time in children was associated with reduced parent–child interactions,[41] in the present study, parent–child interaction was associated with only problematic parent mobile technology use. This could be because the parent–child interactions examined in this study may involve more parent-directed approaches than child-directed approaches, and thus when parents are preoccupied by devices, the parent–child activities examined in this study are less likely to occur.

To gain a better understanding of child psychosocial problems, we analyzed the models separately for externalizing behavior and internalizing behavior. We found that children's internalizing behavior was related to parents' overuse of electronic devices primarily because of the reduction in parent–child activities. It is evident that parent–child activities are conducive to a relaxed family environment that is beneficial for strengthening family bonds and developing children's socioemotional skills, such as the ability to regulate emotions and form new relationships.[42] On the other hand, the association between externalizing behavior and parent problematic mobile technology use was affected by a range of factors, including overall parent–child interaction, distracted parenting behavior, and children's screen time. For parenting factors (parent–child interaction and distracted parenting behavior), they are important correlates of children's externalizing behavior, because many learning and disciplinary processes can take place during parent–child interactions.

Parent technology use during parent–child activities can displace verbal and nonverbal interactions for training child social and emotional skills and can be an indicator of parents trying to take breaks from the boredom or frustrations of childbearing.[8] For the child factor (child screen time), cultivation theory posits that media content could influence children's perceptions and beliefs about the world and consequently change their behavior.[43] This can be particularly problematic for young children with high exposure to electronic screens. Given the ubiquity of misconduct and violence in electronic media, exposure to misconduct and violence during screen time may provoke more aggressive behavior in these children.[44,45] In addition, the fast pace of entertainment media might desensitize these children and make it more difficult for them to focus and concentrate on less stimulating tasks such as schoolwork.[46]

This study has several limitations. First, the cross-sectional design precludes drawing any conclusions about causality. Second, we only collected self-reported data from one parent on parent/child technology use, parenting, and child psychosocial behavior, which might have introduced reporting bias. Although our findings in this study are largely consistent with the hypotheses and previous evidence, more studies using longitudinal methods with multiple informants' reports are needed to validate the model tested in this study. Third, the families were predominantly Chinese living in the poorest neighborhoods of Hong Kong, and thus the generalizability of our results should be considered with caution, especially in parents and children from higher SES families.

Because children follow the example of their parents, it is important for parents to limit their use of electronic devices, especially in front of children, which may help not only promote quality parent–child interactions, but also reduce children's problem behaviors, including screen use behavior. Future research may wish to investigate the impact of other family-level screen use behavior, such as coviewing and interaction during digital media use, on children's psychosocial development. ■

We thank our community partners (The Boys' & Girls' Clubs Association of Hong Kong and Hong Kong Christian Service) and kindergartens and families who participated in this project.

Submitted for publication Mar 27, 2020; last revision received May 30, 2020; accepted Jul 1, 2020.

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50 Years Ago in *The Journal of Pediatrics*

The Newborn Skin

Solomon LM, Esterly NB. Neonatal Dermatology. I. The Newborn Skin. J Pediatr 1970;77:888-94.

Our knowledge about the skin of neonates has clearly increased in the past 50 years. Since the description by Solomon and Esterly of the structure of skin, many discoveries have been made. For instance, we now know that human skin has 3 layers instead of 2, we have better detailed knowledge of the structure of the epidermis, and the functions of its cells (eg, the Langerhans cells as antigen-presenting cells, among others). Thanks to technological advances, we are able to understand the dynamics of the lympathic vascular system, which play an important role in regulation of interstitial fluid pressure and removal of excess extracellular fluid.[1]

Solomon and Esterly reported that the removal of the vernix was followed by desquamation of the epidermis in the majority of infants, probably secondary to transepidermal water loss. Today, vernix retention, when compared with vernix removal immediately after birth, leads to significantly higher amounts of skin hydration 24 hours after birth and lower skin pH, suggesting that the vernix assists in acid mantle development.[2] These findings support the practice of vernix retention for at least 6 hours after birth. In contrast, little has changed about ephemeral cutaneous lesions. The observations made about the common benign pathologies in the newborn skin (eg, the Mongolian spot, salmon patches, erythema toxicum, miliaria, and acne neonatorum) are still current, and a conservative treatment still is recommended.

The conception that the skin not only has a coating function in the newborn, but that it also functions as a barrier to water loss, infection control, thermoregulation, and acid mantle formation (a concept that was already brewing 50 years ago) has led to a better understanding of an amazing organ and its transition from intrauterine to extrauterine life.

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