

Research Article

School-Issued Devices for Home Use in Kindergarten through 5th Grade and Parent Perceptions of Child Learning, Behavior, and Conflict

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With many U.S. schools adopting 1-to-1 school device programs, research on the potential impacts of this device usage at home is critical. In this study, we examined elementary school parents' perceptions of their child's use of their school-issued device for academic skill-building and entertainment *at home*. We then examined the associations between these different types of use and children's learning, behavior, and parent-child conflict over the device use. Overall, we found that children's use of school devices at home for building academic skills was predictive of positive impacts on learning and child behaviors and less frequent parent-child conflict over use. In contrast, children's use of school devices for entertainment purposes was associated with negative impacts on learning and child behaviors and more frequent parent-child conflict over use. Additionally, although most parents received some training or resources, many parents felt that device training from schools was insufficient, and parent perceptions of insufficient training were related to less use of the device for academic purposes and greater parent-child conflict. Considering this duality, we offer suggestions for training by schools, which training emphasizes effective child use of school-issued devices *within the home*.

1. Introduction

Technology has become widely utilized in schools throughout the United States and other countries. According to a 2019 report which surveyed more than 1,200 K-12 teachers in the U.S., 80% utilized computing devices in their classroom, and 40% of teachers had 1:1 devices (i.e., a laptop or tablet device for every child) in their classroom [1]. Moreover, a cross-sectional survey of 1,259 principals from eight U.S. states revealed that 82.5% believed schools should be issuing devices to all students [2]. However, actual issuance of computer devices to students lags behind these beliefs; for example, only 25% of principals indicated that they

issued computers to all of their students, and a further 19.8% issued devices to some of their students [2]. Perhaps more importantly, the three states ranked highest in educational quality (defined by the schools' rankings in the Education Week 2019 "Quality Counts" report which stem from measures such as student achievement) were more likely to issue school devices to all students, and the three lowest ranking states in educational quality were more likely to not issue devices to all students [2]. Although this positive association could be due to many factors, including school funding and sociodemographic characteristics (as the study did not control for demographic characteristics), it is also possible that device availability promotes or facilitates

learning while the lack of school-issued devices could create learning disadvantages. Thus, research is needed to better understand the potential impacts of school-issued devices.

Additionally, computers and devices not only allow students to complete educational activities within the classroom, but for many children, they are also allowed to utilize the device at home. This at-home use in theory provides the children with near limitless access to information and educational opportunities. However, recent large-scale studies focused on the impact of computer device usage on children's outcomes have shown that screen time (at home and at school) is negatively associated with children's stress and achievement [3, 4]. For example, Karlsson [3] analyzed data from a cohort of more than 900,000 fourth graders and found that, controlling for school factors, students who used computers at school (as compared to students who did not) had lower achievement. Moreover, although weekly and monthly computer use at home was positively related to test scores, daily use at home was negatively associated with test scores [3]. Meanwhile, a cross-cultural study of more than 191,000 adolescents from 38 North American and European countries showed that increased computer use (as well as excess TV viewing and electronic gaming) was associated with increased school stress and lower school performance [4]; this led the authors to advocate for decreased screen time to improve adolescent school performance. To be clear, these results may indicate that device use impacts child learning. However, it is quite possible that effects are bidirectional and/or flow in the opposite direction; for example, it may be that students turn to screen use to cope from academic stress [4]. Other research has shown that parents, too, express concerns about children's screen time and the potential impacts of this use on parent-child relationships [5]. Therefore, although computer usage may facilitate the completion of class and homework activities, its use, at both school and home, may at times negatively impact student performance and family relationships. Considering this duality, the focus of the current work was to examine parents' perceptions of the impacts of school-issued devices inside their homes, specifically among elementary school-aged children.

1.1. How Might School-Issued Devices Be Used at Home?

Internet-enabled devices, such as laptops and tablets—which are often what are provided by schools to children [6, 7]—provide children with multiple avenues of engagement. There is the potential for learning-based use, where the child is building academic skills, such as math and reading [8–11]. However, children might also use the device for entertainment purposes. Indeed, many children are accustomed to using screen-based devices (e.g., tablets) at home for playing games or watching videos [12, 13], and they may view tablets as primarily an entertainment tool [14]. A recent national report found that the watching of online videos by children (ages 0 to 8 years) had more than doubled in the space of 3 years, and more than 40% of parents of children ages 5 to 8 years report that their child spends too much time on media and has difficulty stopping their use [15]. Additionally, the report revealed that children were likely to allow

autoplay and videos suggested by the online video platform to choose what they view on the device [15], which suggests that, for many children, their consumption and exploration might be more passive than active. In other words, the way they utilize the device may often be easily influenced by the attractive features and suggestions of the apps and websites they access on the device—which could make intentional learning use more difficult to maintain and less attractive at times than entertainment use. This would not be surprising as Radesky et al. [16] recently found that many of the apps used by young children on their personal or family's mobile devices contained manipulative design features (such as time pressure and attractive lures) meant to draw children into increased use.

1.2. *Impacts on Learning in the Home.* Limited research has been conducted on how school-issued devices that can be taken home might impact learning *at home*. Yet, there is work examining learning outcomes *in the school context*. Digital devices (such as computers, laptops, or tablets) are often regarded as learning tools within educational contexts. K-12 schools may implement a one device per child program so that students learn how to quickly and easily access information, gain technological literacy, and stay excited and motivated in school and about learning [11, 17–21]. Despite the overwhelmingly positive motivations for school device implementation, research on school-issued devices focused on learning outcomes *in schools* has shown mixed results in terms of how it impacts learning. Some of these results are quite positive. For example, Kressin [10] conducted artifact analyses, observations, questionnaires, and interviews of math teachers during the 2019-2020 school year at an elementary school from a midwestern suburban school district with a 1:1 initiative in place. Kressin concluded that technology helped teachers experiment with learning and helped students gain ownership of their learning. Additional research showed significant improvements in learning and academic achievement in subjects such as science, math, and writing [20–22]. However, other studies have found that students made no such improvements. In one study, students in a midwestern district using 1:1 computing did not have higher standardized test scores than the Missouri state average scores [23].

1.2.1. *Potential Positive Impacts on Learning at Home.* A number of studies have presented optimistic findings regarding the use of devices *at home* for learning purposes. For example, Gray et al. [22] interviewed stakeholders (including principals, teachers, information and communication technology coordinators, children, and parents) concerning mobile devices in early learning and found enhanced communication, writing, and numeracy skills in primary school students, as measured through interviews, focus groups, and questionnaires from parents, students, teachers, and principals [22]. Additionally, a study with third graders at a military-connected school in Hawaii showed that students can successfully use computers at home to complete school projects and to practice math and other skills [24]. Russell et al. [25] explored the use of

shared laptop carts to 1:1 laptops among elementary school children in the U.S.—with both groups having universal home access to technology—and found that those with 1:1 laptop access used technology more frequently in the classroom, were more willing to participate in classroom activities, used their computers as a writing tool, worked independently more often, and reported using their home computers significantly more frequently for school work than the laptop cart group. Additionally, a study in Oregon found that teachers believed that 1:1 take-home tablets were conducive to student learning [26]. According to the teachers who were surveyed and interviewed, many educational apps (both game-based and productivity-based) used on classroom tablets by students provided individualized support and promoted the development of higher-order thinking skills and collaboration skills.

From a parent perspective, some parents are eager for their children to use technology for educational purposes and have found that their children express excitement about technology use, are more independent and engaged as 21st century learners, and enjoy sharing the skills that they learned in school by bringing their learning home [18, 27–30]. Parents also feel that 1:1 technology initiatives help their children with career readiness [30] and long-term educational success [31]. Perhaps most importantly, studies have shown that parents believe tablets, in general (not necessarily even school-distributed devices), can help students become interested in and practice important educational skills, like writing, literacy, and communication with peers at home [24, 31–34]. Based on the above school reports and parent/teacher perceptions, it may be possible that learning at home could be positively impacted *if* school-issued devices are utilized by children to build their academic skills (although current empirical evidence of actual effects is lacking).

1.2.2. Potential Negative Impacts on Learning at Home. Although many parents and teachers express positive feelings concerning school-issued devices, some studies have found that sending laptops home with children has no positive effects on learning [35, 36]. In two studies in Peru, for example, when primary school children were given laptops for use at home in a randomized control trial, there were no increases in standardized test scores in math, reading, and cognitive skills [35] or in math and language [36]. Moreover, parents sometimes express concerns that devices at home are detrimental to their children. For example, Drumm [18] found that 17% of parents were dissatisfied with school device programs/devices in some way, and some parents expressed concerns over how the device was detrimental to their child's learning (citing such reasons as desire to play games, misuse, and a deterioration in study skills, worse spelling, etc.). Another study investigated a computer voucher program targeted toward low-income children and adolescents accompanied with educational lessons to encourage the use of computers for academic purposes [37]. Researchers found that access to computers was inversely related to the amount of time students spent on academic activities, such as homework, unless parents medi-

ated the child's computer use through rules about homework and computer time [37]. Also, if students have access to instant messaging features via the school-issued device, which allow the students to connect with their peers, some parents express feeling that the feature was forced on them [38]; of note, many students felt favorably toward the messaging features, which may also suggest tension between parents and children regarding how school devices are used in the home. Thus, when devices are not used to directly build academic skills and are instead used for entertainment, parents may report more negative impacts on learning in the home.

1.3. Impacts on Behavior in the Home

1.3.1. Potential Positive Impacts on Behavior. Research is quite limited regarding the potential impacts of school-issued devices on child behavior *at home*. Drumm [18] found that some parents reported that technology use increased their child's level of independence and responsibility—as the child had to manage their device use and remember to take it to and bring it home from school—and created positive interactions with their child, such as the child being excited about school and sharing what they learned with their family. Other studies found similar results, such as increasing student choice and ownership over their learning, helping students become more goal-oriented, increasing students' engagement and independence with their learning, and giving students more creativity and choice in their learning [10, 26, 32]. In research on general child media use (i.e., not focused specifically on school-issued devices), some parents express that media use calms, quiets, and occupies their child, which at times can alleviate parent stress and allow parents to accomplish necessary household tasks and errands [39, 40]. Research has also shown positive impacts at times on child behavior from viewing educational or prosocial media [41–43]. Combined, these studies suggest that there may be some potential benefits of home device usage in terms of children's behavior.

1.3.2. Potential Negative Impacts on Behavior. Yet, there are always two sides to potential media effects. For example, some parents are concerned about the potential behavioral costs of their child obtaining a school-issued device and the conflict that may arise at home over its use (as the parent must monitor and potentially control use). In one study involving young elementary school students, about 41% of parents reported they were neutral, dissatisfied, or very dissatisfied with a 1-to-1 iPad initiative [18]. Parents complained of detriments to their children (e.g., distraction from learning, too much or inappropriate screen time, and tablet misuse). Notably, many parents cited both positive and negative attributes of tablets at home. It is also noteworthy that some parents shifted from allowing the tablet to come home at the start of the school year to requesting the tablet be left at school, citing various issues, such as them feeling that their child had become addicted to it and tablet use causing conflict at home [18]. This sentiment was echoed in several other studies, wherein parents expressed concerns about increased screen time, unrestricted Internet

access, and distraction when children are given access to computer devices outside of school [11, 17, 22, 26, 29, 33, 35, 36, 44–49]. Finally, sibling jealousy may arise over one child having a device when the other does not [50]. Overall, if a school-issued device is used in ways not dedicated to learning (such as for entertainment), it may be more likely that negative impacts on child behavior and emotions will arise.

1.4. How Schools Prepare Families for Device Use at Home. An additional hurdle may exist when schools do not give adequate training on the use of these devices for home learning. For instance, a 1:1 initiative in Trinidad and Tobago found that the initiative was deemed a failure due to damaged devices, lack of training, and lack of storage facilities and technology support for the devices [47]. Meanwhile, Hunter and Storksdieck [26] found that some parents (especially parents who spoke English as a second language) found it difficult to impose boundaries around laptop use when they had little communication from the school, which resulted in a lack of understanding of the way the tablet was used at school and should be used at home. Accordingly, parents have expressed desires for more resources and training from schools regarding school-issued devices. Drumm [18] cites that parent participants wanted training on iPad setup, management, restricting inappropriate content, and the best educational apps for their children. Researchers have proposed that this could take place in various formats, such as on school websites or through workshops [18] or as part of a parent night training [51]. Parents also believe that students could use more direct instruction on how to use their devices [30]. Some early initiatives even employed a parent-led support network to help students with technical support via phone, email, or home visits [25]. Overall, the consensus among parents is that they need and want resources to help understand how to best use these devices with their children, and they also believe that more training is needed to prepare teachers and students for their use [44, 52, 53]. If a parent is trained on how to manage the device and encourage their child to use it for learning, one could imagine that the device might be used more appropriately (e.g., for learning purposes as opposed to for entertainment) and less conflict may ensue between parents and children.

1.5. The Current Study. In the current study, we examined survey responses from parents, whose elementary-aged child had been given a learning device by their school, regarding their perceptions of how the school-issued device was used at home, resources/training provided by the school, and perceived positive and negative impacts *at home* on child learning and behavior/emotions. Based on the literature reviewed above, we hypothesized that from parents' perspectives:

H1. Using the device for building academic skills would be associated with positive impacts on (a) learning and (b) behavior.

H2. Using the device for entertainment would be associated with negative impacts on (a) learning and (b) behavior.

H3. Using the device for entertainment would be associated with greater conflict between parents and children over the device—as entertainment is not the intended purpose of the device and parents would therefore need to manage and repeatedly limit the child.

H4. Perceived insufficient training from schools would be associated with (a) less device use for building academic skills, (b) more device use for entertainment, and (c) greater conflict between parents and children over the device.

The COVID-19 pandemic and its effects on children and their schooling/learning also cannot be ignored. For example, during the COVID-19 pandemic, technology not only became more common in the classroom, but for many children, it became the classroom [54]. Due to school closures, many families experienced remote work and virtual school; in fact, nearly 93% of families with school-aged children reported distance learning during COVID-19 [55]. Because of this, some have suggested that we rethink the meaning of “screen time” altogether as screens help youth learn and connect with friends and also as increased screen time became more of a necessity than an option for parents and children [56, 57]. However, apparent educational gaps, mental health hardships, and difficulty keeping youth engaged in school arose along with the benefits [56]. In 2020, 63% of parents were more concerned about their children's screen time as compared with before the pandemic [56]. Additionally, many parents had to help their kids use school-issued technology during the COVID-19 pandemic, and parents felt they could have used more support with this technology [58]. With technology becoming such a key part of their child's education in many areas during and after the pandemic, this may have influenced how some parents felt about school-issued devices and the interaction between their children's education and technology use. Thus, we also examined whether differences emerged in our data from pre-COVID-19 (a sample of parents in February 2020) to much later during COVID-19 (another sample of parents captured in May 2021). As this was a new area of inquiry, we could make no reliable predictions about whether perceptions would have become—as a result of the COVID-19 pandemic—more positive or negative concerning school-issued devices and at-home learning.

2. Method

2.1. Participants and Procedures. Participants were recruited via flyers distributed on social media and in parenting groups on Facebook. To participate in the online survey, individuals had to be the parent of a child in kindergarten through 5th grade and their child must have received a device from their school for learning purposes. A sample was recruited during February 2020 (pre-COVID-19; $n = 32$ complete responses), and a separate sample was recruited in May 2021 (during COVID-19, $n = 79$ complete responses, after many children had returned to school in-person and parents and children had experienced almost an entire year back in school). In the final analytic sample ($n = 111$), parents were on average 36.02 years old ($SD = 6.36$; range = 24 to 59), children were 7.65 years old ($SD = 1.73$, range = 5

to 11), and median household income was \$77,500 (SD = \$71,419). Also, 72% were mothers, and 15% were ethnic minorities. The mean depression score on the CES-D-7 was 0.97 (SD = 0.77, range = 0 to 3). There were an additional 80 participants who began the survey but dropped out shortly after. We utilized *t*-tests and chi-square tests and found that females ($\chi^2 = 5.73, p < 0.05$) and those with higher incomes ($t(158) = 2.68, p < 0.01$) and education ($t(166) = 2.37, p < 0.05$) were more likely to have dropped out, while those who completed and those who dropped did not differ on minority status ($\chi^2 = 2.68, p = 0.10$), parent age ($t(179) = 0.29, p = 0.77$), or child age ($t(164) = 1.11, p = 0.27$).

2.2. Measures

2.2.1. Device Use for Building Academic Skills and Entertainment. Parents responded to 11 items regarding their child's use of the school-issued device at home. Items were adapted, from a scale originally used by Drumm [18], to reduce double-barreled items and to change to a frequency scale ranging from 0 (never) to 7 (almost constantly every day). We first performed an exploratory factor analysis on the 2020 and 2021 data separately and allowed for a varimax rotation. These factor analyses revealed a 4-factor solution accounting for 85.78% and 87.59% of the variance in the 2020 and 2021 data, respectively. The items and rotated factor loadings are in Table 1. As the current analysis was focused on children's use for building academic skills and entertainment purposes, we focus on those two factors; moreover, the other two factors related to communication and design-based work do not show consistency in their solutions across the 2020 and 2021 samples. We utilized the mean of items 1 and 8 to create the *build academic skill* score ($r = 0.87$ and $0.70, ps < 0.001$); item 11 was dropped as it did not show consistency across the 2020 and 2021 factor structures. Finally, we utilized the mean of items 9 and 10 to create the *entertainment* use score ($r = 0.73$ and $0.79, ps < 0.001$).

2.2.2. Positive and Negative Impacts on Learning. Parents responded on a 5-point scale, from 0 (never) to 4 (very often), to how often the device had affected learning in a *positive* way across 6 items and then on those 6 items in a *negative* way. Example items included quality of learning, ability to focus on learning, desire to learn, and desire to read. We performed an exploratory factor analysis on the 2020 and 2021 data separately and allowed for a varimax rotation. These factor analyses revealed a 2-factor solution accounting for 84.63% and 64.08% of the variance in the 2020 and 2021 data, respectively. The items and rotated factor loadings are in Table 2. Following the factor solutions, we created a *positive impact on learning* score via the mean across the 6 positive items (alpha = 0.94 and 0.87) and a *negative impact on learning* score via the mean across the 6 negative items (alpha = 0.98 and 0.89).

2.2.3. Positive and Negative Impacts on Child Emotions and Behavior. Parents responded on a 5-point scale, from 0 (never) to 4 (very often), to how often the device had affected their child's behavior and emotions in a *positive* way across 9 items and then on those 9 items in a *negative*

way. Example items included ability to manage emotions, listening to/obeying parents, desire to play with others, and connections with friends. We performed an exploratory factor analysis on the 2020 and 2021 data separately and allowed for a varimax rotation. These factor analyses revealed a 2-factor solution accounting for 90.14% and 69.11% of the variance in the 2020 and 2021 data, respectively. The items and rotated factor loadings are in Table 3. Following the factor solutions, we created a *positive impact on behavior/emotion* score via the mean across the 9 positive items (alpha = 0.98 and 0.95) and a *negative impact on behavior/emotion* score via the mean across the 9 negative items (alpha = 0.99 and 0.93).

2.2.4. Conflict over School-Issued Device Use. Parents responded to 1 item "How frequently do you experience conflict or struggles over your child's use of the device?" on an 8-point scale, from 0 (never) to 7 (almost constantly every day).

2.2.5. Training and Resources Received from Schools concerning the Device. Parents responded yes/no to whether their school had provided any of the following resources/training: (1) school device rules, (2) tips for how to parent the child's device use, (3) online training videos, (4) online workshop, (5) in-person workshop, and (6) parent night at school. We summed these items to produce an overall *training received sum score* (range 0 to 6), with higher scores representing more training/resources received. Parents also responded to the item "Do you feel the resources and/or training the school provided were enough for you?" on a 4-point scale of 1 = "Yes, completely," 2 = "No, a little bit more was needed," 3 = "No, a lot more was needed," and 4 = "No, the school didn't provide any resources/training." We coded the item such that higher scores represented greater *insufficient training*.

2.2.6. Control Variables. To account for differences between the 2020 and 2021 samples (reported in Results), we included those demographic characteristics on which they differed in the main study analyses—including family income, parent education, parent gender, and parent depression. We controlled for depression based on research that parental depression is related to children's media use (e.g., Holmgren et al. [59]). Depression was measured using the CES-D-7 [60] on which parents rated how frequently they had experienced 7 depressive symptoms (e.g., I felt sad) across the last week. Items were averaged with higher scores representing greater depression (alpha = 0.89 and 0.89). We also controlled for parent and child age, as research has shown that individuals of various ages/generations may have different perceptions of technology use [61] while child age can influence how children engage with and understand technology [15, 62]. Finally, the survey contained four attention check items (such as asking for their age in years at the beginning and end of the survey and examining for discrepancies), and we controlled for the number of attention checks missed by participants ($M = 0.65, SD = 0.85, range = 0$ to 3).

TABLE 1: Rotated factor loadings for building academic skills and entertainment use on school-issued devices.

Item	2020				2021			
	Factor 1 Build academic skills	Factor 2 Entertainment	Factor 3 Communication/research	Factor 4 Design	Factor 1 Build academic skills	Factor 2 Entertainment	Factor 3 Communication/research	Factor 4 Design
1. Build academic skills (e.g., practice math, spelling words, and reading)	0.89	0.05	0.24	0.23	0.87	0.08	0.31	0.20
2. Communicate with teacher (e.g., email and messaging)	0.30	0.18	0.85	0.24	0.43	0.09	0.82	0.22
3. Communicate with classmates for school-related things (e.g., email and messaging)	0.17	0.18	0.76	0.46	0.17	0.24	0.80	0.39
4. Create or design things based on personal interest—not school assigned (e.g., take pictures, drawing, multimedia production, and 3D modeling)	0.20	0.30	0.20	0.87	0.18	0.37	0.34	0.78
5. Create or design things for school projects (e.g., take pictures, drawing, multimedia production, and 3D modeling)	0.30	0.06	0.58	0.66	0.26	0.22	0.50	0.67
6. Research to learn about topics of personal interest	0.34	0.30	0.71	0.09	0.26	0.35	0.30	0.79
7. Research to learn about topics for school projects or homework	0.47	0.16	0.78	0.12	0.25	0.23	0.71	0.47
8. Play educational games (i.e., games that are for learning, like math, reading, and coding)	0.87	0.04	0.35	0.05	0.78	0.39	0.22	0.23
9. Play entertainment games (e.g., Minecraft, Mario, and World of Goo)	0.00	0.87	0.27	0.21	0.16	0.84	0.23	0.31
10. Watch video primarily for entertainment	0.22	0.90	0.12	0.11	0.20	0.86	0.10	0.32
11. Watch video in order to learn new information or a new skill	0.74	0.25	0.28	0.24	0.19	0.48	0.34	0.69

Note: bold values represent the items included in that factor.

TABLE 2: Rotated factor loadings for positive and negative perceived impacts of school-issued devices at home on child learning.

Item	2020		2021	
	Factor 1 Positive impact on learning	Factor 2 Negative impact on learning	Factor 1 Positive impact on learning	Factor 2 Negative impact on learning
<i>How often has this device affected the following things about your child in a positive way?</i>				
1. Quality of learning	0.85	-0.27	0.82	-0.11
2. Ability to focus on learning	0.83	-0.35	0.74	-0.13
3. Desire to learn	0.88	-0.23	0.79	-0.06
4. Desire to read	0.87	-0.19	0.75	-0.13
5. Desire to do math/science	0.88	-0.08	0.74	0.06
6. Frequency of reading	0.87	-0.08	0.85	0.03
<i>How often has this device affected the following things about your child in a negative way?</i>				
7. Quality of learning	-0.21	0.94	0.05	0.79
8. Ability to focus on learning	-0.22	0.90	-0.13	0.72
9. Desire to learn	-0.19	0.92	-0.10	0.85
10. Desire to read	-0.20	0.95	-0.09	0.85
11. Desire to do math/science	-0.16	0.93	-0.01	0.82
12. Frequency of reading	-0.19	0.93	-0.06	0.82

Note: bold items represent those included in the factor.

2.3. Analysis Plan. We first examined descriptive statistics and partial correlations (controlling for missed attention checks) for our study variables using SPSS 26. To examine H1, H2, and H3, we utilized a series of five regression models with impacts on learning, behavior/emotions, and conflict as the outcomes. Predictors included control variables (e.g., parent gender, income, age, and depression), building academic skills, and entertainment use. To examine H4, we utilized a series of three regression models with impacts on learning, behavior/emotions, and conflict as the outcomes. Predictors included control variables (e.g., parent gender, income, age, and depression) and parent perceptions of insufficient training. We originally also included total training received as a predictor, but we found multicollinearity between the two training variables—when both training variables were entered simultaneously into the model, they both became nonsignificant, while when each training variable was entered without the other, each was a significant predictor; thus, we retained the stronger predictor: insufficient training. Additionally, including sample year (2020 versus 2021) in all models, as well as interactions between our main predictors and sample year (e.g., build academic skills \times sample), allowed us to examine whether differences pre-COVID-19 to post-COVID-19 emerged in our models, after controlling for other factors.

3. Results

3.1. Descriptive Statistics. In terms of how the school-issued devices were used in the home (see Table 4 for means), we found that building academic skills was more common on

average than entertainment use. Examining how many engage “a few times a week” or more often in the individual types of use within these scales, 54% build academic skills and 59% play educational games, while for entertainment, 48% watch videos and 43% play games. Half or more perceive positive impacts on their child’s learning (62%) and negative impacts on their child’s learning (50%) at least sometimes or more often. Most parents feel that it never or rarely positively impacts behavior (66%), while about half say that it negatively impacts their child’s behavior at least sometimes (53%). Furthermore, about half (49%) express experiencing conflict over their child’s use of the device “once a week” or more often. Interestingly, 10% of parents express experiencing conflict over the device at least “multiple times a day,” and this increases to 27% if “once a day” is also included. Partial correlations between how the device was used and perceptions of impact (see Table 4) revealed that those children who more often used the device to build academic skills were also those who more often had positive impacts on learning and behavior, while those who more often used it for entertainment were those who more often had negative impacts on learning and behavior and showed greater frequency of conflict over the device with parents.

In terms of training, we found the following percentage of parents received these resources/training: 65% device rules to parents, 43% tips for how to parent the device use, 24% online workshop, 22% online training videos, 11% parent night at school, and 7% in-person workshop. However, only about half of parents (49%) felt that schools had provided sufficient resources/training. Partial correlations (see Table 4) revealed that those who felt worse about the

TABLE 3: Rotated factor loadings for positive and negative perceived impacts of school-issued devices at home on child behavior and emotions.

Item	2020		2021	
	Factor 1 Positive impact on behavior/emotions	Factor 2 Negative impact on behavior/emotions	Factor 1 Positive impact on behavior/emotions	Factor 2 Negative impact on behavior/emotions
<i>How often has this device affected the following things about your child in a positive way?</i>				
1. Ability to manage emotions	0.93	-0.01	0.85	0.00
2. Listening to/obeying parent(s)	0.92	-0.07	0.82	0.09
3. Desire to play with others	0.95	-0.04	0.88	0.07
4. Desire to play with toys	0.94	-0.10	0.91	0.10
5. Desire to play outside	0.97	-0.12	0.85	0.02
6. Desire to exercise	0.94	-0.14	0.88	-0.04
7. Frequency of play (not on screen)	0.95	-0.15	0.82	0.02
8. Connections with friends	0.91	0.00	0.73	-0.05
9. Ability to control anger	0.95	0.01	0.84	0.07
<i>How often has this device affected the following things about your child in a negative way?</i>				
10. Ability to manage emotions	-0.02	0.92	-0.06	0.84
11. Listening to/obeying parent(s)	-0.08	0.91	-0.15	0.77
12. Desire to play with others	-0.01	0.96	0.13	0.80
13. Desire to play with toys	-0.08	0.97	0.15	0.80
14. Desire to play outside	-0.08	0.97	0.02	0.84
15. Desire to exercise	-0.08	0.97	0.10	0.82
16. Frequency of play (not on screen)	-0.11	0.96	-0.17	0.76
17. Connections with friends	-0.07	0.94	0.22	0.78
18. Ability to control anger	-0.07	0.94	0.02	0.84

Note: bold items represent those included in the factor.

resources/training also rated that their child was less likely to use the device for building academic skills, the device was negatively impacting learning and behavior at home, and conflict was more frequent over the device.

3.2. Potential Differences Pre-COVID-19 to Later after Return to In-Person School. We examined for potential differences in demographic characteristics between the 2020 and 2021 samples utilizing *t*-tests and chi-square tests. Those in the 2021 sample had lower income ($t(102) = 3.09$, $p < 0.01$), lower education ($t(107) = 3.73$, $p < 0.001$), and higher depression ($t(106) = -3.92$, $p < 0.001$); the 2021 sample also included a greater proportion of males than the 2020 sample ($\chi^2 = 10.49$, $p < 0.001$); no differences emerged on minority status ($\chi^2 = 0.003$, $p = 0.95$), parent age ($t(109) = 0.94$, $p = 0.35$), or child age ($t(109) = -0.01$, $p = 0.99$). Due to these differences between the 2020 and 2021

samples, we included demographics as controls in the main study analyses.

Additionally, after controlling for demographics and depression, we found in our models (reported in Tables 5 and 6) that sample (2020 vs. 2021) was not a significant predictor of any outcome variable in any of our models, nor did we find any significant moderation of associations between our main study variables (e.g., build academic skills) and our outcomes. Thus, in our study, any pandemic-related shifts in device usage did not appear to affect the associations between our variables of interest.

3.3. H1: Using the Device for Building Academic Skills Would Be Associated with Positive Impacts on (a) Learning and (b) Behavior. Standardized betas from our regression models predicting positive impacts on learning and behavior are in Table 5 under model 1 and model 2. In support of our hypothesis, we found that greater use for building academic

TABLE 4: Partial correlations and descriptive statistics for main study variables.

	1	2	3	4	5	6	7	8	9
	Build academic skills	Entertainment	Pos. learning	Neg. learning	Pos. emot./beh.	Neg. emot./beh.	Conflict over device	Training insufficient	Training received sum
(1) Build academic skills	1	0.35****	0.31****	0.13	0.35****	0.00	0.13	-0.23*	0.23*
(2) Entertainment		1	-0.21*	0.41****	0.09	0.49****	0.61****	0.11	-0.04
(3) Positive impact on learning			1	-0.40****	0.52****	-0.31****	-0.41****	-0.32****	0.22*
(4) Negative impact on learning				1	0.00	0.69****	0.55****	0.27**	-0.02
(5) Pos. impact on emotion/behavior					1	-0.09	-0.06	-0.23*	0.24*
(6) Neg. impact on emotion/behavior						1	0.65****	0.35****	-0.13
(7) Conflict over school device							1	0.35****	-0.13
(8) Training insufficient								1	-0.41****
(9) Training received sum									1
Mean	2.80	2.58	2.17	1.75	1.43	1.85	2.94	1.91	1.72
Std. dev.	1.64	2.20	0.87	1.00	1.10	1.06	2.09	1.07	1.14

**** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, $N = 111$, 2020 and 2021 sample data combined. Number of missed attention checks was included as a control variable in these partial correlations.

TABLE 5: Standardized betas from the regression models predicting perceptions of child learning, behavior, and conflict over the device.

	Model 1 Positive impact on learning	Model 2 Positive impact on behavior/emotions	Model 3 Negative impact on learning	Model 4 Negative impact on behavior/emotions	Model 5 Conflict over school device use
<i>Controls</i>					
Sample (2021 vs. 2020)	0.05	0.05	0.15	0.09	-0.01
Parent gender	-0.19 [†]	-0.04	-0.05	-0.11	0.06
Education	-0.21 [†]	-0.10	0.24*	0.22 [†]	0.18 [†]
Income	0.08	-0.27***	-0.10	-0.04	-0.02
Parent age	-0.01	0.04	-0.14	-0.12	-0.17 [†]
Child age	-0.20*	-0.05	0.04	-0.02	0.12
Attention checks	0.24 [†]	0.17	-0.06	-0.05	0.004
Parent depression	0.03	0.18 [†]	-0.05	-0.01	0.09
<i>How device is used</i>					
Build academic skills	0.51***	0.37***	0.04	-0.25*	-0.14
Entertainment	-0.30**	-0.10	0.53***	0.68***	0.72***
<i>F</i> -value	6.42***	12.58***	3.69***	4.26***	9.73***
<i>R</i> ²	0.42	0.59	0.29	0.33	0.52

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, and [†] $p < 0.10$. Gender is coded as 1 = male and 0 = female. Sample is coded as 1 = 2021 data and 0 = 2020 data. All other variables are grand mean centered. Attention check is coded such that higher scores represent more attention checks missed. Interactions with sample (i.e., build skills \times sample and entertainment \times sample) were tested, found to be nonsignificant, and were removed.

skills predicted greater positive impacts on learning ($\beta = 0.51$, $p < 0.001$) and behavior ($\beta = 0.37$, $p < 0.001$). In model 4, we also found that it predicted a lower negative impact of device use on behavior ($\beta = -0.25$, $p = 0.04$).

3.4. H2: Using the Device for Entertainment Would Be Associated with Negative Impacts on (a) Learning and (b) Behavior. Standardized betas from our regression models predicting negative impacts on learning and behavior are in Table 5 under model 3 and model 4. In support of our hypothesis, we found that greater entertainment use predicted greater negative impacts on learning ($\beta = 0.53$, $p < 0.001$) and behavior ($\beta = 0.68$, $p < 0.001$). In model 1, we also found that it predicted a lower positive impact of device use on learning ($\beta = -0.25$, $p = 0.04$).

3.5. H3: Using the Device for Entertainment Would Be Associated with Greater Conflict between Parents and Children over the Device. Standardized betas from our regression model predicting conflict over school-issued devices are in Table 5 under model 5. In support of our hypothesis, we found that greater entertainment use predicted greater conflict over the device ($\beta = 0.72$, $p < 0.001$).

3.6. H4: Insufficient Training from Schools Would Be Associated with (a) Less Device Use for Building Academic Skills, (b) More Device Use for Entertainment, and (c) Greater Conflict between Parents and Children over the Device. Standardized betas from our regression models pre-

dicting building academic skills, entertainment use, and conflict over the device with insufficient training are in Table 6. In support of our hypothesis, we found that greater parental feelings of schools providing insufficient training predicted less child building academic skill use ($\beta = -0.22$, $p = 0.01$) and greater conflict over the device ($\beta = 0.29$, $p < 0.001$). Contrary to our hypothesis, after controlling for parent depression and other factors, greater parental feelings that schools provided insufficient training did not predict child entertainment use ($\beta = 0.07$, $p = 0.42$). Interestingly, greater parent depression predicted greater child use of the school-issued device for both building academic skills ($\beta = 0.28$, $p = 0.02$) and entertainment ($\beta = 0.24$, $p = 0.03$).

4. Discussion

The focus of the current work was to examine parents' perceptions of the impacts of school-issued devices *inside their homes*, instead of examining potential impacts *at school* like has been the focus in much of the previous research. We sampled parents whose child was in kindergarten through 5th grade and had been given a device by the school for learning purposes. We found that children used these devices at home for both education and entertainment purposes, and overall, use for more educational purposes predicted more positive outcomes, while use for entertainment purposes predicted more negative outcomes. Additionally, although some parents received at least a little training on

TABLE 6: Standardized betas from the regression models predicting frequency of child device use for building academic skills and for entertainment, as well as conflict over the device.

	Model 1 Build academic skills	Model 2 Entertainment	Model 3 Conflict over school device use
<i>Controls</i>			
Sample (2021 vs. 2020)	0.03	-0.04	0.05
Parent gender	0.03	0.19 [†]	0.08
Education	0.00	0.11	0.11
Income	0.07	-0.17 [†]	-0.01
Parent age	0.06	0.17 [†]	-0.16 [†]
Child age	0.03	-0.08	0.13
Attention checks	0.40**	0.36**	0.05
Parent depression	0.28*	0.24*	0.02
Build academic skills	—	—	-0.04
Entertainment	—	—	0.65***
<i>Training</i>			
Training insufficient	-0.22*	0.07	0.29***
<i>F</i> -value	8.39***	7.73***	10.63***
<i>R</i> ²	0.46	0.44	0.57

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, and [†] $p < 0.10$. Gender is coded as 1 = male and 0 = female. Sample is coded as 1 = 2021 data and 0 = 2020 data. All other variables are grand mean centered. Attention check is coded such that higher scores represent more attention checks missed. Interactions with sample (i.e., training \times sample) were tested, found to be nonsignificant, and were removed.

device usage, about half perceived the training to be insufficient. Moreover, perceptions of insufficient training were associated with less frequent use of the device for learning and more parent-child conflict.

Encouragingly, and in support of previous work (e.g., Gray et al. [22] and Hunter and Storksdieck [26]), school devices did have a positive impact on learning and behavior at home, specifically when children were using them to build academic skills. This finding highlights the benefits of school device usage at home, supporting its use as a home-based 21st century learning tool. However, our findings also showed that school-issued devices are being used at home for activities other than learning. A little more than half of parents (54% to 59%) reported that their child used the device at least “a few times a week” for learning purposes, but almost just as many (43% to 48%) reported that their child used it at least “a few times a week” for entertainment. Although use of a school-issued device for entertainment is not inherently negative, as our models showed, greater use of the device for entertainment purposes predicted negative impacts on child’s learning and behavior and, importantly, more parent-child conflict over device usage.

Although parents have the primary responsibility for monitoring and constructing boundaries around their child’s computer use in the home, schools should also be cognizant that when these school devices are allowed inside homes, there is the potential for misuse, child behavior changes, and parent-child conflict. This might be especially true for vulnerable populations. As our results showed, parental depression predicted greater child engagement with school-issued devices overall, which aligns with research showing that maternal depression is predictive of problem-

atic media use by the child [59]. However, even outside of vulnerable populations, parents appear to have many concerns, about their children’s device usage, with many having questions about whether it is hurting their children’s socio-emotional and cognitive development [5]. With recent large-scale studies showing that computer use at school and overall screen time are negatively associated with educational attainment [3, 4], it may be time for schools to reevaluate the positive and negative impacts of 1 : 1 school device provision both within their schools and in children’s homes.

Although recent research shows that school administrators perceive benefits of 1 : 1 school device usage and schools with 1 : 1 devices have higher educational ratings [2], device *overuse* has become a salient concern for both parents and teachers. In fact, it has prompted some schools to pilot programs that restrict students’ use of their devices during selective school times, like lunch breaks [63]. This prevailing concern may be one of the reasons why schools offer device use training and resources for parents—to try to circumvent some of the potential negative effects of its use while increasing positive uses.

In previous studies, parents indicated interest in education both for their children [30] and for themselves [51]. In line with these findings, our parent participants reported desiring “a lot” more training around school-issued device use. Considering the inadequacy of this training was predictive of less use of the device by the child for academic skills and more parent-child conflict over its use, adequate training opportunities appear to be linked with effective child use of school-issued devices. Although it is not clear whether a lack of training caused the effects or whether those parents who are struggling with their child and the device now desire

more training from schools, results suggest that better resources/training from schools could potentially help parents to manage the devices and establish healthier and more learning-promoting habits in their children's device use. There are many ways schools can administer this training, and Pessnell's [51] participants offered several useful suggestions, including hosting parent night trainings on using technology, monitoring children's tech use, setting up expectations with students, and supporting students as they learned remotely. Parents appear to be flexible on how this training is delivered, which will allow schools to tailor training to their specific populations and educational needs and policies.

4.1. Limitations and Conclusion. Although our study adds to the literature on school-issued device usage in the home, there are limitations to be mentioned. First, our sample was one of convenience and was not nationally representative, which limits the generalizability of our findings. Additionally, unlike our other variables, which included multiple items to capture a range of behaviors and interactions, we measured conflict over device usage with a single item. Though we found significant interactions between this single-item conflict variable and our outcome measures of interest, future studies could include more questions about parent-child conflict to examine, more directly, the context and severity of this conflict. Additionally, the results are based on parental perceptions. It is possible that parent, teacher, and child perceptions could differ, and perceptions may differ from the actual amounts of device use for various purposes. Future work could expand into examining objective device use (for learning versus entertainment) and multiple measures of children's learning and emotions/behavior. It is also not possible for us to rule out that general parent attitudes concerning child media use (that existed prior to their child being provided a school-issued device) may have affected their perceptions of their child's device use and its impacts.

Despite these limitations, our study adds to the body of research on how school-issued devices and technologies are affecting children, families, and learning. In line with previous research, the findings from our study exemplify the duality of device usage among children. Certainly, having access to a school-issued computer or tablet may facilitate engagement in learning activities and access to information; however, the perceived negative impacts on child behavior and conflict also cannot be ignored. Indeed, the connection between using the device more often for entertainment and negative impacts on learning, behavior, and conflict offers a promising route for educational training by schools. More specifically, schools could offer guidelines and resources for both parents and children that encourage the use of school-issued devices for educational activities and limit their use for entertainment purposes.

Data Availability

The deidentified data may be shared on reasonable request to the corresponding author.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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