

Screen Time Tantrums: How Families Manage Screen Media Experiences for Toddlers and Preschoolers

Alexis Hiniker, Hyewon Suh, Sabina Cao, Julie A. Kientz
Human Centered Design and Engineering, University of Washington
Seattle, WA, USA
{alexisr, hyewon25, sabinac, jkientz}@uw.edu

ABSTRACT

Prior work shows that setting limits on young children's screen time is conducive to healthy development but can be a challenge for families. We investigate children's (age 1 - 5) transitions to and from screen-based activities to understand the boundaries families have set and their experiences living within them. We report on interviews with 27 parents and a diary study with a separate 28 families examining these transitions. These families turn on screens primarily to facilitate parents' independent activities. Parents feel this is appropriate but self-audit and express hesitation, as they feel they are benefiting from an activity that can be detrimental to their child's well-being. We found that families turn off screens when parents are ready to give their child their full attention and technology presents a natural stopping point. Transitioning away from screens is often painful, and predictive factors determine the pain of a transition. Technology-mediated transitions are significantly more successful than parent-mediated transitions, suggesting that the design community has the power to make this experience better for parents and children by creating technologies that facilitate boundary-setting and respect families' self-defined limits.

Author Keywords

Children, screen time, mediation, non-use

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

INTRODUCTION

As screen media have proliferated in the United States and elsewhere, very young children have become routine users of a variety of technologies, including newer technologies like smartphones and tablets [52]. A growing body of digital media targets very young children (ages 1 to 5), and more educational apps are created for children under 5 than for any

other age group [39]. Screen media have been shown to provide valuable and enjoyable experiences for young children, such as teaching empathy [8], improving word learning in preschoolers [37], and fostering creativity and collaboration in family groups [49]. Preschoolers transfer problem solving skills they acquire in digital environments to physical ones [22], and parents' and toddlers' joint use of eBooks and interactive apps has been shown to foster emergent literacy [36].

Despite the value of child-oriented media, concerns abound about the appropriateness of young children's routine or extended exposure to screens. A summary of existing literature reports that more than 2,000 prior studies have demonstrated that children emulate violence they see on screen and that increases in exposure to violent media lead to increases in hostility and hostile attribution bias (i.e., the perception of hostility in others) [41]. Viewing content designed for older audiences can increase fear and anxiety in young children [47], extensive media exposure before age three has been causally implicated in attention disorders [50], and increases in the amount of time spent with screens are associated with increased risk of obesity, disordered sleep, and other health concerns at all ages [15,40]. Thus, parents are tasked with determining the uses of screen media they feel are appropriate for their young children and setting boundaries on media consumption with which they are comfortable.

Extensive prior work has examined the ways in which parents commonly mediate children's use of screen media, particularly with respect to television [33]. All of the common types of mediation are recommended by the child development research community [41], but restrictive mediation in particular is strongly encouraged for very young children. The American Academy of Pediatrics recommends no exposure to screens at all before the age of two and no more than thirty minutes of child-oriented, commercial-free, content daily for older preschoolers [2,3] (though their stance on this subject is also in flux, see [4]). Restricting media exposure can be challenging for the parents of young children, both because of the ubiquity of screens in modern life [17,29,52] and because the toddler years are characterized by struggles between parents and children as they learn to negotiate boundaries together [32,38].

We build on prior research on restrictive mediation by examining very young children's experiences at the beginning and ending of screen media experiences. We looked specifically

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at these transition points because they provide an opportunity to understand families' experiences enacting their own screen time rules. By looking at all of the ways that children disengage from screen media, we were able to explore the extent to which children self-limit, the extent to which parents set and enforce limits, the effectiveness of such limits, and the contextual factors that predict smooth or painful transitions. Understanding what successful boundary setting looks like for children at this stage of development promises to provide guidance to families who want screen media to be a part of their young child's life, but who also want to balance these experiences with a variety of other activities. It also promises to inform the design of technologies for young children that facilitate, rather than resist, families' limit-setting.

To understand what young children's transitions to and from screen media experiences look like in practice, we first conducted an interview study with 27 parents of children between the ages of 1 and 5. Using conventional content analysis [21], we used these interviews to uncover themes related to both spontaneous and preplanned screen media transitions and then used these themes to develop a diary study protocol. We recruited a separate set of 28 families to participate in our diary study, and parents documented all screen time transitions that these children experienced over a period of two weeks. This two-part approach enabled us to capture first parents' high-level impressions of boundary setting followed by rich description of specific transition events.

We found that this is a salient topic for parents of young children and a struggle for many families. Parents worry that their children's exposure to screens is unhealthy and feel guilt that they, as parents, derive benefits from what they perceive to be an activity that can be detrimental to their children. Though parents perceive screen-free activities to be superior to screen-based ones, they permit their children to transition to screen experiences in order to keep them occupied when parents must tend to essential tasks. Parents then require that children transition back to screen-free activities. We found that specific factors facilitate and impede smooth transitions, and that parents are partially aware of these predictive relationships. We found that limits enforced by technology are more effective than limits enforced by parents, suggesting a role for the design community to help families set and abide by boundaries that they feel good about.

BACKGROUND AND RELATED WORK

Understanding and Designing for Parental Mediation

A large body of research has investigated parents' role in regulating their children's experiences with technology, particularly with television [6,10,23,30,33,34,44,51]. Prior work shows that across technologies, parents engage in systematic patterns of mediation, most commonly: 1) *active mediation*, talking with children about the content they are engaging with; 2) *restrictive mediation*, setting limits on children's media consumption, and 3) *co-engagement*, the act of consuming content together with children without discussion or critique [5,33–35,42].

All three of these practices are recommended by the child development research community for children under 5 [41,46], though several studies have shown that restrictive mediation is the most common technique for bounding young children's time with technology [43,45,48]. Child development research also reports that, at this age, this form of mediation is conducive to healthy development [2,3], making limit-setting an important part of screen media use. Our work builds on these prior investigations by exploring restrictive mediation for toddlers and preschoolers across all of the different content formats and form factors that families use today, expanding on the existing knowledge of mediation which focuses primarily on older children using older technologies, such as television, VCRs, video game systems, the Internet, and desktop computers [16,30,31]. As screens now accompany families nearly everywhere they go, parents have both the obligation and the opportunity to define more complex limits on screen media use, and children have the opportunity to transition to and from screen media in a variety of underexplored contexts. We also build on existing documentation of mediation practices by describing families' transition experiences, the moments in which these boundaries are enacted.

A limited amount of prior work has examined the design of technologies to support parental mediation. Since 1997, the Children's Television Act and Telecommunications Act have mandated content ratings to help parents make informed choices for and with their children about technology exposure. However, prior work suggests that parents have limited awareness of ratings and their meanings, particularly for newer ratings systems [13]. The "V-chip," a technology for filtering television content based on these ratings, received a poor reception and limited uptake due to usability challenges and inadequate marketing [19,28]. More recently, HCI researchers developed a novel system for collaborative parent-child content filtering, allowing families to set boundaries together on the screen media exposure they feel is appropriate [18]. Together, this work suggests that a demand for design solutions to support parental mediation exists, but that creating valuable tools for this space is challenging. We contribute to this research effort by documenting the ways in which design decisions embedded in the technologies children use support or impede mediation.

Limit-Setting in Early Childhood

We also chose to investigate screen time transitions in this age group because of toddlers' emerging ability to exert intentional control over their environment and activities [14]. As children approach 24 months of age, their sense of autonomy and internal control systems for language, memory, and inhibitory control all become more sophisticated, leading to independent thinking and goal-setting that they were incapable of as infants [38]. However, they typically lack the self-regulation, language, and bargaining skills of older children [7], making the process of negotiating boundaries with parents and adhering to such boundaries more challenging.

Though models that reduce child development into a progression of sequential developmental stages have been critiqued as overly simplistic [14], prior work shows clear trends in children's development of collaboration, self-regulation, and negotiation skills despite families' highly individualized experiences with limit-setting [25–27]. Mayall and colleagues describe a 'continuously re-negotiated contract as a feature of children's relationships with their parents,' and this negotiation process becomes more nuanced and collaborative as children develop [1,32]. We leverage this existing work by intentionally looking at screen time transitions during a life stage where adults expect children to transition between activities frequently [9] and where parents and children are learning to negotiate norms and expectations.

Examining "Screen Time"

Throughout this paper, we refer to children's periods of screen media exposure as "screen time" to denote a demarcated period of time during which the child is using a technology with a screen, much like the term "dinner time" might be used to refer to a period of time during which an individual is eating dinner. This does not reflect any particular emphasis on the amount of time spent with screens, though we did explore that theme to the extent that it was surfaced by interviewees. We used "screens" as the defining feature of the experiences we explored, as prior work shows that the presence or absence of a screen is the dichotomy used in the pediatrics research community [2,41] and in other prior investigations of mediation practices [12,45].

METHODS

Interview Methods

We conducted semi-structured interviews with 27 parents (5 fathers) of one or more children between the ages of 1 and 5 (inclusive). The majority of interviews (25) were conducted in person, but we accommodated requests for phone interviews as needed. We designed the interview protocol to take 30 – 45 minutes, and the average length of interview was 38 minutes (sd = 16). Altogether, we collected 16 hours and 55 minutes of interview data over the spring and summer of 2015. At the conclusion of each interview, the participant received a \$15 gift card to Amazon as a token of our appreciation.

We defined our initial interview protocol to probe parents' experiences managing their child's time with screen media. Our initial protocol asked parents when, where, and what type of screen media their children consumed and what parents did during children's screen time. We asked parents about the limits they set on their children's screen time, asking questions such as "Do you generally limit your child's screen time? Why or why not?" and "In your opinion, what would be 'ideal' screen time look like for your child?" We then asked parents questions about how their child's screen time experiences usually end, e.g., "How does your child usually respond when screen time is over?" and "How often does your child choose to end screen time on his/her own?" Finally, we asked about challenges they experience transitioning to and from screen

time, strategies they use to overcome these challenges, and advice or strategies they use to manage children's screen time that they believe might be effective for other parents as well. We intentionally did not bring preconceived hypotheses to this investigation.

As we conducted interviews, we iteratively analyzed our data using an open-coding approach. We iteratively revised our protocol to accommodate emerging themes, and our final protocol included all of the topics described above as well as: questions probing the extent to which families have developed routine around screen time, the ways in which features of the technologies they use smooth transitions to and from screen time or make them more difficult, and the extent to which children's transitions to and from screen time resemble transitions to and from other activities.

All interviews were transcribed by the research team or by a professional transcription service and verified by a member of the research team for accuracy. One member of the research team iteratively coded all transcripts and developed a code book with categories and example quotations. Final code categories included: type of technology, type of content, discussion of autoplay, boundaries established by technology itself, warnings in advance of a transition, screen-time routine, screen-time friction, transition triggers, and ideal screen usage. Codes were discussed collaboratively among research team members using example quotations. A second researcher coded a randomly selected transcript to verify reliability; Cohen's κ was .843. Codes were used as the basis to develop analytical memos about themes.

Diary Methods

Using the themes uncovered in our interviews, we distilled a set of beliefs about screen time transitions that were common across our participants and used these to generate hypotheses about the factors that predict smoother or rockier transitions. We then developed a diary protocol to evaluate these hypotheses. We asked participants to complete this protocol every time their child used screen media in their presence over a period of two weeks. We deliberately did not specify strict definitions for "screen time" or "screen media" and instead asked participants to define what screen time means for their family. We asked participants to complete the protocol after the child transitioned away from a screen media experience so that the participant could document how it ended.

In each diary entry, the participant first filled in the blanks in the following sentence:

My child stopped: [screen time activity, e.g., "watching Sesame Street"] **on a(n):** [technology, e.g., "iPad"] **because:** [trigger, e.g., "he wanted to play outside"] **while I was:** [parent activity, e.g., "washing dishes"].

Next, the participant reported how the child felt about this transition on a five-point Likert scale ranging from "1: My child was very happy about this transition" to "5: My child was very upset about this transition." The participant then reported how unusual the child's reaction was and then checked all

applicable items from a list of possible attributes of this particular event, such as: “*I gave my child a warning that screen time would be ending,*” “*My child and I were watching or playing with the screen together,*” and “*Having screen time in this context is part of my child’s routine.*” The participant then had an opportunity to provide comments further describing or contextualizing this particular instance of screen time.

We recruited a new set of participants, distinct from our interviewees. Diary participants included volunteers for our interview study who were not interviewed because we reached data saturation before they could be included. They also included families recruited through an institutional participant pool established by screening all birth records in the Seattle metropolitan area. Altogether, 28 families participated in the diary study and generated a combined 380 diary entries.

Each participant logged exactly one child’s screen time transitions, documenting a total of 28 children (14 boys). Children’s ages ranged from 14 to 66 months (see Table 1). Though we recruited from a participant pool that reflects the demographic composition of the entire region, respondents were all married or partnered mothers and over-representative of white families (85%) relative to regional demographics (71% [53]). Respondents’ household incomes were higher than the regional median of \$73,441 [53].

Each parent was instructed to record each instance of the child’s screen time for a period of two weeks. The parent was given a link to an online survey with the diary protocol. The participant then submitted this survey after each screen time instance. If they did not record any screen time instances on a given day, the participant received a reminder email in the early evening asking them to record any screen time they had forgotten to document. Participants were instructed to record each instance as soon as possible after it ended and no more than 24 hours later. Participants who participated in all 14 days of the diary study (even if their child did not have screen time each day) received \$53 in compensation as a token of appreciation. Participants received the same compensation regardless of the number of diary entries in order to incentivize honest documentation.

We used the code categories and the hypotheses generated from our interview study as the basis of our analysis of diary entries. We performed a directed content analysis [21] of screen time descriptions using the code categories from our interview study. We coded: the types of media content children consumed, types of form factors, types of transition triggers, and types of parent activities. We performed a quantitative analysis of diary results to evaluate the hypotheses drawn from our interview data.

RESULTS

Interviews

Parents in our interview study reported that their children use screen media primarily to view video content and that they do this on traditional television sets, personal computers, tablets, and smartphones. Videos range from brief YouTube

Child gender	M=14, F=14
Child age (months)	Mean=38, sd=16, range=14 – 66
Parent gender	M=0, F=28
Parent race	White (86%), Asian (7%), mixed race (7%)
Household income	>\$100K (54%), \$75-100K (18%), \$50-75K (18%), \$25-50K (7%), No response (4%)
Marital status	Married or partnered (100%)

Table 1: Diary participant demographics

clips, to 22-minute cartoon episodes, to long-form movies. In general, older children consumed longer content. Ten parents said that they own at least one interactive app or game that their child has played at least once, but only two families reported that game-playing was a routine occurrence. Many parents reported that their children use computers, tablets, and phones to view family photos or videos or to video chat with other family members, but they focused on professionally produced video content (and not interactive apps, games, family photos or video chat) when discussing their child’s screen time.

The most dominant theme across interviews was a general negative impression among parents of screen media for young children. The majority of parents (25 out of 27) explained that, for children, screen media is often enjoyable, and perhaps innocuous in small doses, but needs to be: 1) limited to short durations, 2) dominated by non-screen activities, and 3) carefully monitored by parents. Much like parents might restrict children to a single serving of dessert per day or per week, nearly all participants felt that screen time should be doled out on occasion in small quantities. For example, parents told us that:

“Kids have too much access to technology and too much screen time is not very good for them... [my husband thinks] they should have zero access to screens, but I think that’s cruel and unusual punishment.” (P12)

“I don’t think that screen time is the most appropriate thing at that age. I think some of it is fine. I don’t believe that it’s bad for them, but I think excessiveness is bad...for her development, if we played with her versus her watching something, it would be better.” (P17)

“We try to limit her as much as possible, because we know that it’s not very good for her...usually what I say is as little as possible.” (P24)

Of these 25 parents, some believe that technology’s influence on young children is inherently negative, explaining that it: “*encourages ADD,*” “*makes kids kind of crazy,*” “*feeds them what [they] should be interested in,*” and “*lead[s] to kids having poor attention spans and always wanting to be entertained.*” Others reported a perception that technology is not inherently bad, and in fact can even contribute to learning new concepts or creative play, but displaces other activities of higher quality. This second group of parents said things like: “*There’s nothing wrong with watching Doc McStuffins. It’s a positive, happy, wonderful show, and that’s not the point. The point is, what else could you be doing with that time?*” Both groups of parents (those who feel screen media for children is inherently problematic and those who feel screen media is only problematic because it displaces more important activities) reported that,

in an ideal world, their child would only use screen media occasionally for short periods. Three reported they would prefer their child have no exposure to screen media at all.

Transitioning To Screens: How Families Turn Them On

Despite these reservations, all of our participants reported that they do permit their young child to use screen media at least occasionally (an inclusion criterion for participation, and a common practice in the overwhelming majority of American households with children in this age range [52]). Given parents' concerns and their desire to limit screen exposure, we explored the circumstances in which they *do* allow their children to use screen media. We found that 23 participants (85%) permit screen time primarily or exclusively when they need to occupy their child so that the parent is freed to engage in activities without interruption. Parents explained that it is challenging to do essential household chores, shower, or tend to younger siblings when a child is present. They further explained that screen media provide an effective tool for enabling these necessary tasks. Because of their general impression that screen exposure is undesirable, the parents we interviewed withhold screen media and strategically allow access primarily when the parent is unable to give the child his or her attention. For example, parents described their children's screen time by saying:

"I started [giving her screen time] because I wanted to cook dinner. I would say 'Let's watch a movie,' ...because she could really focus on that and that gives me the time that I need to make dinner." (P5)

"When we give him the phone it serves...the purpose of keeping him distracted so that we can do X, Y, Z." (P2)

"A lot of times it's about giving us space to get something else done without having to manage her...I would say the majority is we're getting some other task done around the house or with our infant son." (P27)

"I choose a video that I want to be the correct amount of time. If I need him to be occupied for a half hour, then I'll choose something that's 30 minutes. If I need an hour, I'll choose a movie that's an hour." (P23)

Parents reported that they also strategically wait to give their children access to screens until they as parents feel overwhelmed or drained from the demands of attending to their children, though they said that this is less common than using screen-based distraction to facilitate chores. For example, parents told us that they turn on a screen-based experience for their child: "when I've run out of steam," "when my wife needs a break, cause it's hard to spend a whole day with a three-year-old," "when we are really, really tired and she's really hard to deal with," or when "I just need two minutes to decompress." In these and many other examples, parents reported that they make themselves fully available to their children as often as possible and for as long as possible but use screen media as a replacement for parent-child interaction when their stamina for parenting has run dry. They report that they use brief periods of screen time to enable breaks from parenting and then turn off the screen when they are rejuvenated and ready to resume. As one parent explained, "It's not like we come home on

a random day and we're a little tired and that's when we do it, we do it when we REALLY need a break." Though some of these parents also told us that screen media use is contingent on good behavior or other child-driven factors, they reported that children's screen media access is fundamentally scheduled around times when parents feel incapable of providing their child with what they perceive to be the superior alternative of screen-free adult attention.

The parents we interviewed view the relative freedom they derive from their child's screen time with scrutiny and, given their belief that extended screen exposure is suboptimal for young children, view this as a potential conflict of interest. Though they feel that using screens to facilitate their own productivity or emotional well-being is an appropriate choice, they explain that it nevertheless induces feelings of guilt and ambivalence:

"She'll use [screen media] while we're getting ready to feed her and get her clothes and everything before getting her to daycare. We don't really like doing that, but it's really this balance of trying to meet her developmental needs by not having her watch a lot of stuff and also kind of meeting the family needs, we need to get her out the door to daycare by a certain time." (P4)

"Sometimes we'll ask, 'Do you want to watch a cartoon?' if we need to get something done and she's being a little clingy or she wants us to play with her. Those are not our proudest parenting moments but sometimes for everyone's sanity it makes sense." (P17)

"[Letting them use screen media] just kind of feels like a negative thing to do. If [my husband and I] were better parents we would always have energy to play with them, we wouldn't need a screen to kind of like, take a break from our children. Which seems like a sad thing to me to do, you know, in my fantasy imagination of me as a parent." (P11)

Although many of these parents believe that it is perfectly reasonable to permit their child to indulge in occasional screen media experiences, just as it might be perfectly reasonable to permit that same child to eat an occasional bowl of ice cream, the fact that screen media use, unlike ice cream, comes with side benefits for the parent leaves parents questioning their choices and self-auditing. As one mother explained, "We've decided that a little bit is okay, but I still wonder every single time I let him watch if I'm letting him watch for the right reasons for him, or if I'm letting him watch because I need space and I need to have him distracted. So that's very guilt-inducing." Parents described their decision to strategically allow screen media when they need parenting support by saying: "I hate to admit that I do this," "no one ever feels great about doing it," "I feel guilty if I go past 30 minutes," "I definitely feel self-conscious that we've given him any screen time," and "I don't really know: is this good? Is this bad?" Though parents' strategic use of screen media to occupy their children was pervasive, reservations about this practice were equally common.

Finally, many parents reported that they make exceptions and allow unrestricted screen time to ease infrequent situations that are especially challenging, tedious, or frightening for their children. Parents reported that they allow screen me-

dia on airplane rides, while cutting their children's fingernails, during medical procedures such as sonograms and echocardiograms, during discussions with pediatricians about their child's health, as a reward for taking unpleasant medication, during haircuts, and during home medical treatments, such as nebulizer administrations to control asthma. Parents expressed none of the guilt or internal conflict that they feel over routine screen media use at home, saying things like "it's just so useful and relieving and such a short period of time that it's completely fine" or unequivocally explaining that "the iPad is fabulous" for its ability to help a child stay calm and happy through a stressful procedure.

Transitioning from Screens: How Families Turn Them Off

Parents reported that they are typically the ones who end their child's screen time. Though 23 parents told us that they could recall at least once instance in which their child turned off or walked away from a screen unprompted, most described this as "rare, really rare." Some parents said their child never ends screen time voluntarily, saying things like "I don't think he would close it [on his own]...I would have to say something pretty fabulous like, 'We're gonna go horseback riding!' or 'You're gonna go fly a plane!' I don't think so." A minority of parents said that their child does not have the attention span for extended screen time and will sometimes wander off, particularly if the content is intended for an older audience. Parents of eight children said that, though their child rarely or never ends screen time voluntarily, he or she will close the screen independently when asked to do so.

Parents reported varying degrees of pain when transitioning away from screens. Nearly all parents (93%) reported that their child throws a tantrum, whines, or resists ending screen time at least occasionally, while 37% reported that screen time almost always ends with a fight. Even if it is infrequent, the transitions that lead to conflict are difficult to manage, and this transition pain shapes parents' view of the entire screen time experience. As one parent told us, "the biggest concern I have now is that he fights like hell when it's time to turn it off...there are days when I feel like either I should rip the TV off the wall and throw it away...or I should just give in and say, as much as you want. Cause I'm just so tired of fighting the fight about the end." Similarly, another parent explained: "It's a bit of a deal with the devil; it buys us 30 minutes of peace, but often for the cost of a tantrum afterwards. Which is awful."

We probed the strategies parents use to reduce the frequency of painful transitions and mitigate the pain when they occur. Parents surfaced a recurring set of strategies for fostering a smooth end to screen time, each of which is described below.

Strategy 1: Routine Eleven parents said that they feel that establishing routine around screen time improves transitions. Several parents explained that their child can easily disengage from routine periods of screen time that occur at predictable times but will resist ending ad hoc periods of screen time. For example, one father explained: "[Routine morning screen time] is such a regular thing that she knows basically. When it's on the weekend and she's watching something, it's looser...those are the times where we end up battling her more. The

morning routine is pretty good, the other time it's totally hit or miss." Other parents explained that avoiding arguments is "all about the routine and consistency," or credited routine as something that has "been set up for a very, very long time [and] created a situation where we have very little friction when time's up."

However, a few parents were reluctant to set up an established routine around screen time, explaining they felt it would give screen media too much prominence in daily life or increase the total amount of time children spent with screens. As one parent explained: "Because it [the schedule] changes so much, it does make it less predictable, and maybe that does breed this fight that we have at the end. I don't know. But at the same time, I have a hard time coming to terms with the idea that I would just say, 'Yeah, you get to watch TV every morning.'" These parents predict that the benefits of routine will come at the cost of increased total screen time and, as a result, have resisted establishing a routine with their child.

Strategy 2: Warnings Many parents (21 of 27) also regularly use an advance warning to attempt to improve transitions. In these cases, parents tell their child things like: "only two more minutes," or "just one more video" as a way of setting expectations on the fly and preparing their child for an upcoming transition. Five participants expressed confidence that this practice improves transitions. However, far more participants were unsure of its effectiveness. Interviewees reported regularly warning their child in advance of a transition, but admitted that "the warning doesn't always register," "I don't know how much he even understands the 'time is up' yet," "it doesn't always help," "he knows it, but that doesn't mean he's happy," "he doesn't necessarily hear or comprehend," and even "I don't think she particularly likes us just leaning over her shoulder and saying there's X amount of time left. She gets annoyed with that." Yet despite parents' uncertainty over whether this approach is beneficial, they still report using this widespread practice consistently.

Strategy 3: Support from Technology Finally, the majority of parents (20 out of 27) brought up technology itself as an influential factor that predicts whether a transition will be smooth or painful. Parents reported that when technology provides natural transition points, the experience of putting down screens is smoother for their child. Some parents explained that this can happen unintentionally (such as a battery dying or loss of an internet connection) or predictably (such as the end of a movie, video playlist, or television episode). Parents reported that in both cases, children are more amenable to ending screen time than they are when the transition is mandated by the parent alone without corroboration from technology. Parents said that they sometimes intentionally use technology as a scape goat, telling their children that a toy no longer works when the batteries have died or pretending that certain online content is unavailable.

Parents most frequently mentioned episode boundaries and autoplay features as ways in which technology facilitates or impedes transitions. Parents find episode, playlist, and movie end points to be easy boundaries to enforce, and children experience these as natural stopping points. Ending a video that

is already in progress, even just a few seconds after it has begun, is much harder. As one parent described: *“I definitely need to be there [for] the last 10 to 15 seconds to kind of get in there [to turn it off]. If the new one starts, then he’s usually very upset.”* Another parent told us: *“Netflix automatically starts the next episode... [unlike] XBOX video. There [on XBOX video], you have to make a conscious choice, you have to do something with the remote to get to the next episode...I much prefer that, because it gives a natural stopping point and the continuity is broken.”* Eleven parents mentioned autoplay on Netflix or on YouTube, saying that they have to actively work against this feature and keep precise tabs on their child’s viewing so they can jump in and interrupt at the exact moment when one video ends, allowing the child to view the entire experience but not allowing the next to begin. Parents report they are not always able to execute on this timing perfectly, which makes transitions harder. As one parent explained, *“Sometimes it does [automatically start the next episode before the parent can stop it], and that’s with Netflix. And it’s very challenging. She’ll usually throw a fit.”*

Some parents told us that they view this feature as a deliberate design choice intended to undermine families’ ability to transition away from screens. These parents said: *“Things like Netflix try to fight that [ending screen time] because they want to enable binge watching, where you just go through and through.”* Other parents told us that they believe this tactic is effective and does delay transitions. They also told us that believe autoplay would prevent their children from ever self-limiting or self-monitoring: *“I would say that if we were to put on Netflix autoplay of a cartoon they would sit in front of that for as long as it autoplays...I think it’s really hard for them to put it away, even if they’re no longer having fun and they’re bored.”* Across interviewees, autoplay came up frequently and was universally described as a feature parents fight against in order to create the bounded experience they value.

Parents reported that they value transition messaging from technology that aligns with the messaging they give to their children themselves. Some parents determine their own message based on the message that comes from technology, telling us that they set their child’s daily limit at 30 minutes *“because it [is] the easiest way to stop,”* or that they stop at *“that natural breaking point, when the movie ends...so when it ends.”* Others parents define their own limits, but wish that technology would follow their lead and create natural breaking points that align with the limits they have set. These parents said things like, *“I would love something that auto-shut off...I feel like I shut enough things down”* and *“If you could be like ‘Ope! Computer turned off! Sorry, I can’t help you!’ it would be nice.”*

In addition to the widespread strategies of establishing routine, using a “two more minutes” warning and relying on support from technology, parents also mentioned other factors that predict transition success, though these minor themes came up less often. Some parents reported that the child’s mood, level of hunger, tiredness, and level of engagement with the specific screen experience all influence the success of transitions. Other parents told us that transitions are more successful when the parent creates a diversion or has a new

activity prepared in advance. A few parents mentioned that transitions are smoother for their child when parent and child negotiate in advance and agree on a fixed quantity of screen time with a well-defined end point.

Diary Study

Based on our interview results, we hypothesized that: 1) established screen time routine, 2) use of a “two more minutes” warning, and 3) support from technology would all be associated with smoother transitions. We used our diary results first to describe children’s screen time transitions and second to evaluate these three hypotheses.

The 28 children in our diary study used screen media a combined 380 times over two weeks. On average, children used screen media 0.97 times per day ($sd = 0.47$) for an average of 33 minutes each time ($sd = 36$). Across all children, the number of instances of screen time over two weeks ranged from 3 to 34, and the duration of an individual instance of screen time ranged from 30 seconds to 4 hours. In response to the prompt asking how the child reacted when the period of screen time ended, parents most frequently reported that their child’s reaction was neutral (59% of transitions). Another 20% of transitions evoked a positive reaction, and 22% evoked a negative reaction. This was consistent with our interviewees’ reports that painful transitions are a non-dominant but routine occurrence.

We coded each diary entry for the technology the child used, the type of activity he or she engaged in, and the type of trigger which lead to the transition away from screen time. We found that the form factor was more varied than the activity: 50% of diary entries reported that a child viewed content on a traditional TV, but more than 70% reported that the child consumed traditional passive video content. Other form factors included tablets (22%), smartphones (18%), and personal computers (7%), while other activities included playing games (17%), browsing photos (3%), and video chatting (3%). This was consistent with interviewees’ descriptions of the ways in which children use screen media.

We found that a small set of categories described the triggers that initiated transitions away from screens. The most common transition trigger was a situational change which made screen time impossible or incompatible with family activities (39%). For example, participants told us that their child stopped watching a DVD in the car when they arrived at their destination, turned off the TV because dinner was ready, stopped what they were doing because a friend arrived, or had to relocate and abandon the activity when a younger sibling peed on the couch. The second-most common trigger was the child’s own whim; 25% of the time, screen time ended because the child lost interest, became distracted, or chose to pursue another activity. The regular occurrence of child-initiated transitions was at odds with interviewees’ reports that this is quite rare.

The third-most common transition trigger was spontaneous interjection by the parent (15%). In these cases, parents told

us that, “I decided that was enough TV,” “I told her she was done with screen time for now,” or “I put the laptop away.” These instances were distinct from standing rules or negotiated contracts and instead represented cases where the parent reported making an ad hoc decision that it was time for the child to disengage from screen media. The full set of transition triggers is shown in Table 2.

We also coded diary entries for the activity the parent was engaged in while the child was using screen media. We found that the most common parent activity during children’s screen time was chores (45% of all diary entries), including caring for other children in the family (particularly infants). Occasionally, these chores included child care for the child using screen media (such as cutting a child’s hair, cutting a child’s finger nails, or brushing a child’s teeth). The second-most common parent activity was to engage with screen media together with their child (35% of diary entries), an occurrence that was not prevalent among interviewees descriptions of their child’s screen time. The third-most common parent activity was self-care activities, such as exercising, showering, eating, or getting dressed. The complete set of categories is shown in Figure 1.

Transitions and Routine

Based on interviewees’ claim that established routine around screen media improves children’s ability to disengage, we hypothesized that transitions following routine periods of screen time would go more smoothly than transitions following ad hoc periods of screen time. Parents reported that 61% of transitions marked the end of a period of spontaneous screen time, while 39% marked the end of a routine period of screen time that was a predictable part of the child’s day. We compared ad hoc versus routine transitions using the extent to which a child was upset about the transition as our dependent measure. To account for the fact that our 380 samples were not independent, we used a block ANOVA to compare these two groups. We found a highly significant main effect of the presence of routine on the extent to which children were upset, with children transitioning away from screens more easily when it was a routine part of the day (mean = 2.84, sd = 0.71, 95% CI [2.72, 2.96]) compared to when it was ad hoc (mean = 3.10, sd = 0.85, 95% CI [3.00, 3.21], $F(1, 331) = 16.751, p < .001, \eta^2 = .048$).

Because some interviewees reported that they expect that having a routine would ease transitions but choose not to establish one because they fear it will increase total screen time, we compared the duration of ad hoc periods of screen time to the duration of routine periods of screen time. Using a block ANOVA, we found that ad hoc screen time lasted an average of 29.5 minutes (sd = 27.1, 95% CI [26.1, 33.0]), while routine screen lasted significantly longer (mean = 40.0 mins, sd = 47.2, 95% CI [32.0, 47.9], $F(1, 331) = 7.113, p = .008, \eta^2 = .021$). Together, these results provide strong suggestion that routine is associated with smoother transitions back to the physical world and slight suggestion that it may be associated with longer periods of screen time.

Reason: %	Description: Example
Context: 39%	The situation changed in such a way that created a natural end point for screen time: “His haircut was done” or “It was time to leave for summer camp.”
Child: 25%	The child proactively chose to end screen time without any prompting or situational change: “She wanted to eat a snack and put the phone down.”
Parent: 15%	The parent decided that it was time for the child to end the experience: “Watching YouTube videos for longer than that will rot your brain so I made him stop.”
Technology: 11%	The physical technology or the content it was showing led the child to a natural stopping point: “The game was over.”
Rule: 9%	Screen time ended in accordance with either a standing household rule or a one-time contract that the parent and child established before the experience started: “We only let her watch one show at a time”
Fell Asleep: 2%	The child fell asleep using screen media

Table 2: Reasons for ending screen time

Transitions and Warnings

Based on the pervasive use of warnings among interviewees to help children transition away from screens, we also hypothesized that warning children of an upcoming transition would be associated with more successful transitions. Unexpectedly, but consistent with interviewees’ uncertainty around this practice, a block ANOVA showed that children were significantly more upset about transitions when they were warned by parents that screen time would be ending (mean = 3.35, sd = .71, 95% CI [3.22, 3.49]) than when they were not warned (mean = 3.03, sd = 0.81, 95% CI [2.78, 2.97], $F(1, 331) = 20.34, p < .001, \eta^2 = .058$).

We re-ran this analysis excluding all transitions in which children ended the interaction themselves (N = 93), as children were generally happy about the transitions they initiated and these were not transitions where it would make sense for parents provide warnings. In order to avoid a misleading result that confounded the child’s sense of agency with the presence of a warning, we compared transitions with and without warnings only if the parent, technology, or other external factor dictated the transition. However, even after accounting for this potential confound, this phenomenon persisted, and transitions with warnings were still more painful (mean = 3.36, sd = .71, 95% CI [3.22, 3.49]) than those without warnings (mean = 3.06, sd = .81, 95% CI [2.94, 3.18], $F(1, 238) = 10.21, p = .002, \eta^2 = .041$).

To try and understand this counterintuitive finding, we examined parents’ open-ended descriptions of transitions with

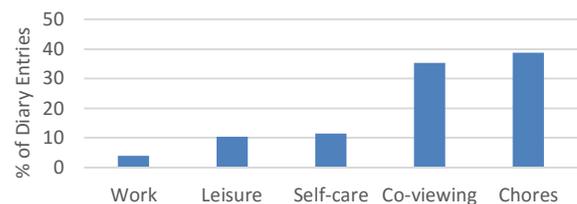


Figure 1: What parents did during children’s screen time

and without warnings to identify themes that might account for the relationship between warnings and unhappy transitions. We looked to see if transitions with warnings were associated with shifts to less-preferred activities (such as bedtime or bath), shifts to preferred activities (such as outdoor play), more or less routine, or less companionship. We were unable to identify any significant differences that might account for children's negative response to warnings.

Transitions Triggered by Parents vs. Technology

Finally, we analyzed our diary data in light of interviewees' claim that support from technology is useful for smoothing transitions. We hypothesized that transitions triggered by parents ($N = 55$), for example, "I decided he needed to play outside" or "I told him it was time to put the camera away" would be associated with more friction than transitions triggered by the technology itself ($N = 43$), for example, "The DVD ended" or "The iPad battery ran out." Our diary data confirmed interviewees' prediction: we found that children were less upset when the technology turned itself off (mean = 2.98, $sd = .74$, 95% CI [2.66, 3.23]) than when the parent turned it off (mean = 3.47, $sd = .79$, 95% CI [3.28, 3.71]) $F(1, 69) = 8.104$, $p = .006$, $\eta^2 = .105$), suggesting that technology may be an effective third-party mediator for easing transition pain.

We also examined this effect using duration of screen time as a covariate. After controlling for screen-time duration, a small but significant effect persisted such that children remained more upset about transitions triggered by parents than about transitions triggered by technology ($F(1, 68) = 6.780$, $p = .011$, $\eta^2 = .091$).

DISCUSSION

Our results show, first, that facilitating transitions to and from screen media is important to parents, who largely believe that prolonged screen media exposure is detrimental to children and that their 1–5-year-olds will not self-limit. Parents view screen media as a treat (even using "dessert," "sugar," and "candy" as analogies for screen time) and are comfortable with screen media for their children as long as they are able to bound it to treat-like portions and smoothly transition their children back to screen-free experiences.

Parents also report a conflict of interest that concerns them: they strategically use their child's screen time as an opportunity to accomplish necessary chores, take care of themselves, and even take breaks from the demands of parenting. The majority of our participants schedule children's screen time specifically to facilitate these opportunities for themselves. While parents are glad to have this option and feel that it is the best way to meet the needs of the entire family, they are uncomfortable with the fact that they are incentivized to provide their child with screen time, an activity they view as unhealthy in large doses. Even though most of our participants are comfortable with some screen media exposure for their child, and some parents say that a small amount of screen time is better than none at all, they worry about the possibility that they benefit from this activity at their child's expense, saying both that they believe they are doing the

right thing, but also that they worry they are not. This ambivalence, coupled with parents' view of screen time as a risk to children's well-being, fuels their desire to set limits on screen media exposure and transition their child away from screens on schedule.

Screen Time and Routine

Parents report that several factors influence the ease with which their child transitions away from screens. They report that establishing a routine around screen time, such that children engage in screen-based experiences in well-defined contexts with established end-points, makes transitions much smoother. Our diary study results were consistent with these reports, showing that routine periods of screen time are associated with smoother transitions and fewer battles between parent and child.

However, some parents reported that they are hesitant to establish a routine because they worry this will cement screen time into their family schedule and increase the amount of time their child spends with screens. Our diary study did show a significant increase in duration during routine periods of screen time relative to ad hoc ones. However, it remains unclear whether this increase is driven by the fact that screen time is predictable, by the fact that these families are comfortable enough with screen time to routinize it, or by some other factor. Future work remains to understand the implications of establishing routine screen time and the positive and negative effects this has on a family's media diet.

Screen Time and Warnings

We found that nearly all parents who limit screen time use warnings and countdowns to set their children's expectations about upcoming transitions. Despite the prevalence of this practice, parents expressed some uncertainty about whether or not it is effective. Results from our diary study showed that, not only were warnings *not* predictive of smoother transitions, they were in fact associated with rockier transitions with greater parent-child conflict. After removing transitions from our analysis where the child dictated the end point and combing the qualitative description of each transition type for themes that might suggest differences, we were unable to find any evidence that transitions with and without warnings are contextually different in a systematic way. However, it remains possible that the difference we saw stems from the fact that parents are more likely to warn their children about transitions that they anticipate will be challenging.

Given the power struggles between parents and children that characterize this stage of development [27], it is plausible that transition warnings do effectively set expectations but also serve as an unwelcome reminder of parent authority. Other approaches to expectation-setting that do not come with this constraint may be more effective, consistent with our finding that routine and third-party mediation are more useful. Other techniques, such as associating situational cues with the end of screen time, or asking a child how many more minutes he or she would like to continue using a screen, may

effectively set expectations without threatening children's sense of autonomy.

Technology as a Transition Mediator

Finally, we found that there is clear role for the technology children use to support their transitions. Parents told us that they set limits based on the boundaries that technology makes easy to enforce, they use technology as a scape goat to foster smoother transitions, and they wish they could look to technology for third-party mediation. They said that transitions are smoother when technology is on their side, and rockier when they are working against technology. These instincts appear to be well-founded: our diary study corroborated that children are significantly less upset when technology itself limits screen time than when parents do.

Some technologies already offer such support, such as the recently launched YouTube Kids app or Amazon Kindle. Other technologies do just the opposite, making boundaries flexible and harder to enforce with autoplay and suggested-video features. Parents experience these features as frustrating, misaligned with their values, and even reported believing that these design choices were deliberately made to undermine parents' efforts to set limits. Our results suggest that families who adopt technologies that respect the limits they set will experience less screen-related friction, and technologies that intentionally build in support for self-defined limits will best meet the needs of their users.

Many possible design solutions could foster rather than impede limits. In addition to removing autoplay and suggested video features, screen media experiences could prompt families to set goals or ask at natural stopping points if they would like to continue or take a break. Screen media experiences could adopt some of the transition practices that parents report using, such as offering suggested next activities or asking the child how many more minutes he or she would like to watch. It would also be valuable to investigate whether the two-more-minutes warnings that children resist from parents are better received when they come from technology.

Limitations and Future Work

Our results are drawn from a small sample living in a single, U.S. urban area and are over-representative of married mothers and families of high socioeconomic status. Prior work has documented disparities in screen time practices between families of different races, ethnicities, and income levels [52], suggesting a need for future work to explore the transitions in a broader population and in diverse cultural contexts.

Our work also reflects the viewpoints of parents alone and does not represent children's perspectives. Though eliciting the perspectives of children as young as 1 can be challenging, recent work has begun to explore creative and non-traditional methods for collecting meaningful data from very young children [11,20,24]. Future work observing screen time tran-

sitions directly and talking to children about their experiences would be a valuable complement to the data presented here.

Finally, our results are based on self-report and our diary data reflects self-reported behaviors that participants knew in advance they would be documenting. As our interview participants reported a general negative perception of the practice of permitting screen time, our results may be skewed by a Hawthorne effect in which parents acted in ways they would feel comfortable reporting to others.

CONCLUSION

The contributions of this research are first to provide an empirical understanding of parent attitudes toward young children's screen time and contextual details about their transitions to and from screen-based experiences. For parents, these transition points are a defining feature of children's screen media experiences and their own mediation practices. Though parents want their young children to be able to indulge in occasional screen media use and are glad that this treat for the child provides a simultaneous break for the adult, the fact that they allow their child to transition to screens in order to meet their own needs gives them pause. By documenting this tension and parents' perception of their own conflict of interest, we provide a clearer picture of the way in which screen media features in the lives of young families and the role it serves in meeting the needs of all family members.

Parents enforce transitions away from screens when they have finished attending to their own needs and when technology provides a natural stopping point. Transitioning without the support of technology is an uphill battle, and the second contribution of this work is to document the clear implication to design for this scenario. Parents set boundaries based on what technology makes easy to enforce, they blame technology for transitions when they need a scape goat, and they repeatedly said that they want the technologies their children use to back them up when they say screen time is over. Families experience features that offer potential boundaries as supportive and features that erode boundaries as manipulative and frustrating. Together, our results show that families value screen media for young children but want these experiences to come with limits. They show that technology can be their partner or their adversary, and that we have the opportunity to make design choices that are the solution to tantrums rather than the cause.

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