

Investigating Attention and Normative Dissociation in Children's Social Video Games

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ABSTRACT

Children's video games are controversial for their deeply engrossing nature. We conducted an interview and observational study with 17 eight-to-thirteen-year-olds to examine how they deploy their attention while gaming. In sessions of 60-75 minutes, a research assistant toured either Roblox or Minecraft, following the lead of a child participant. We analyzed a segment of these interviews to understand participants' patterns of *normative dissociation*—experiences of complete cognitive absorption that exclude processing of the environment beyond the focus of attention. Our analysis revealed that many of our participants had experiences that fit the model of normative dissociation. Participants reported becoming deeply absorbed in games to the point of losing track of time and not paying attention to their surroundings. Game design influenced children's patterns of normative dissociation, and in particular, *user-paced traveling* through the game environment and *game-initiated pauses* allowed children to more easily attend to stimuli outside the game. We recommend parental controls leverage

these points of game play to collaboratively support children's time management during gameplay.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in collaborative and social computing**; **Empirical studies in HCI**; *Walkthrough evaluations*.

KEYWORDS

youth gaming, social gaming, attention, normative dissociation

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1 INTRODUCTION

More than 90% of children in the US play video games [4]. Minecraft, for example, has amassed 141 million active players worldwide [69], and the gaming industry is expected to reach a market size of \$431.87 billion by the year 2030 [25]. This has led to an increase in attention and investment in games for children and adolescents [10]. As video games continue to grow in popularity among children, so too have parent concerns. As of 2022, more than half of parents of children who use gaming devices or consoles said that they felt



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their child spends too much time gaming [47], with many parents reporting that gaming interrupts family time and sleep [27]. Parents are also often concerned about the impact of gaming on children's attention spans and performance in school [22], leading many to critique and research the addictive nature of gaming [28]. Many parents also find that transitioning their children away from devices causes tension and power struggles within the family [37], increasing concerns about problematic game play.

Because of this, we were interested in understanding children's state of mind and disengagement experiences when playing online social games. In particular, we were curious about whether participants experienced instances of *normative dissociation* while gaming. Normative dissociation is defined by deep absorption on a very narrow range of experience, to the point that normal environmental awareness, sense of the passage of time, self-reflection, and agency is suspended [8, 11, 12]. This is distinct from *attention*, in which a person is focused on one particular aspect of their environment but can flexibly redirect their focus as interruptions and distractions occur [12].

To explore these themes, we conducted a study with 17 participants between the ages of 8 and 13 who regularly play Roblox and/or Minecraft. We conducted semi-structured interviews about participants' experiences playing online social games while they played a game of their choice. We centered our investigation on how children deploy their attention during game play and how game design impacts attention and normative dissociation. We examined both observed and self-reported instances of normative dissociation by analyzing video recordings of gameplay and verbal responses to interview questions about gameplay.

We found that many of our participants' experiences playing games reflected characteristics of normative dissociation [12], as children described becoming deeply absorbed in the game to the point that they no longer processed their immediate environment. They described ignoring both internal sensations and external interruptions to stop gaming, although this was often unintentional. For example, they explained that their parents would call their names and tell them to stop playing, and they would hear a noise but not take in the information. They also experienced lack of awareness of the passage of time, and sometimes ignored biological cues like hunger and thirst while gaming. Through our observations, we also found that the design of a game influences children's attention, with children most able to respond to interview questions when engaged in user-paced traveling through the game environment and game-initiated pauses, and least able to respond when engaged in combat and survival gameplay.

From these findings, we contribute, first, a qualitative analysis of children's attention and normative dissociation during video gameplay, of relevance to the ongoing societal and scholarly discussion of the absorbing nature of video games. We demonstrate that, for many children, ignoring external interruptions during gameplay is not simply an act of stubbornness or disobedience. It often reflects the fact that children are normatively dissociated and therefore deeply absorbed in gameplay to the point of suppressing processing of the surrounding environment. We also contribute recommendations for designers and caregivers seeking to disrupt normative dissociation at the end of gameplay and describe ways to make these disengagement experiences more child-centered. Specifically, we pinpoint

parts of gameplay in which initiating disengagement from gaming would be most effective: user-paced traveling through the digital environment, and game-initiated pauses. Lastly, we contribute several recommendations for parent-child collaborative transitions, building on prior literature. It is our hope that these will help to ease tension around transitioning away from online games and empower both children and caregivers to engage in collaborative management of online gaming.

2 RELATED WORKS

A large body of work has examined children's gaming from many different angles. We draw together findings that demonstrate: 1) public and academic concern about the effects of gaming on children's attention and wellbeing, 2) the fact that specific design decisions influence how a game affects its users, and 3) the known potential for games to be highly absorbing and immersive, and how this may lead to normative dissociation. Building on this foundation, our study examines children's self-reported and demonstrated experiences of normative dissociation, as characterized by absorption in gameplay to the point of excluding other parts of the environment from conscious awareness.

2.1 The Controversy of Youth Gaming

There are widespread concerns that youth video game play may have negative impacts on children's behavior and mental health, potentially leading to emotional and social problems. Research has partially corroborated these concerns; for example, frequent competitive gaming has been linked to decreases in prosocial behavior [42], and children who prefer aggressive video games display more aggressive and less prosocial behavior than those with a low preference for these games [67]. Gao et al. [28] found that roughly 10% of adolescents display behaviors associated with "internet gaming disorder," an online gaming addiction described in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR) [6]. Those who game excessively are also more likely to want help reducing their gameplay [54]. However, research has also shown that an "addiction" label does not always capture children's complex relationship to gaming well, and that much of the discourse regarding "problematic play" may be driven more by media panic than children's gaming behavior [17].

Other work has raised concerns about the effects of gaming on children's attention. Correlational studies document a positive association between exposure to video games and the development of attention disorders [62]. However, other work concludes that gaming has the potential to *enhance* children's attentional control and flexibility [16], and recent research has documented the potential to use video games as a tool for treating Attention Deficit/Hyperactivity Disorder [56]. Other research has shown that there is a great deal of speculation about the potential for games to erode children's attention but comparatively little scientific evidence to support those claims [23].

Research has also shown other benefits to youth gaming. Granic et al. [30] highlighted the potential cognitive, motivational, emotional, and social value of game play. For example, for children on the autism spectrum, games may serve as a powerful vehicle for

social and metacognitive learning [7, 32], and in Minecraft in particular, autistic youth have felt empowered to modify the game in ways that support their emotional and social needs [59, 60]. In general, video game play is associated with improvements in cognitive skills like inductive reasoning, mental rotation and spatial visualization, spatial attention distribution, visual selective attention, and memory [9]. Children's stated motivations for playing video games also reflect the potential for gaming to have a positive influence on their development, and they say they turn to gaming for: competition or challenge, social interaction with friends, experiencing a sense of achievement and mastery, fun, emotional regulation like stress relief, and the exploration of different identities and creative expression [26, 55].

Developing a precise understanding of children's real-time experiences in gaming worlds is essential to teasing apart these competing narratives of promise or peril [53]. In this study, children guided the research team through a game experience, giving us access to both the child's reflections and their moment-by-moment game interactions. We focused our recruitment on Minecraft and Roblox because of the popularity of these online social games. We chose not to restrict the genre of Roblox game to gain a wide breadth of gaming experiences. We contribute empirical data demonstrating how children respond to specific interface elements, enabling us to add specificity to the conversation about how games may affect aspects of child wellbeing.

2.2 Child-Centered Game Design

Prior work shows that there are many ways in which designers' decisions can alternatively support or undermine children's autonomy and wellbeing, and researchers have advocated along many different lines for child-centered design. For example, prior work has shown the value of giving children an active role in designing the games and other technologies that affect their lives [24, 31, 65], and Moser [50] introduced the child-centered game development (CCGD) framework to prioritize the involvement and participation of children in the game design process. Similarly, Tan et al. [64] advocate for a participatory design approach, highlighting the active involvement of children in the early stages of game design, and Marco et al. [45] emphasize the importance of involving children in test sessions to identify usability problems and guide design improvements in tabletop games. These approaches center children's agency, needs, and interests during the design processes.

Other work has advocated for designers to respect children's attention and refrain from manufacturing compulsions to engage with technology or deliberately attempt to extend children's time-on-task. This has included the design of novel systems that encourage children and youth to engage with technology intentionally (e.g., [21, 35]), reports of exploitative design patterns and manipulative advertising [48, 58], documentation of industry practitioners' perspectives on designing for child wellbeing [39], and calls for a commitment to respectful design practices [57, 66]. Researchers have pointed to a need for design that supports both engagement *and* disengagement experiences [5, 8, 36], and other work has created novel research prototypes to support children in transitioning away from engaging experiences (e.g., [33, 61, 70]).

Relatedly, a large body of work has documented that games and other digital experiences best support children when they invite collaboration and engagement from parents, teachers, peers, and other loved ones [20]. Many researchers have contributed to advancing a family-centered design agenda (e.g., [14, 43, 44, 46]). And joint-media engagement [63], the practice of engaging with technology together with another person, has been shown to enhance children's academic learning, emotional wellbeing, and sense of bonding. Prior work shows that the design of a system influences the extent to which children are responsive to the people around them and invite others to co-engage with them [34]. Other work has shown that children and parents systematically respond to game design to enable collaborative practices [51].

In the current study, we build on this history of child-centered game design research in two ways. First, we examine children's attention through the lens of *normative dissociation*, and how it affects their ability to attend to their environment during gameplay. This advances the existing conversation about respecting child attention and designing for intentional usage experiences. Second, we offer insights for parents and designers to support young gamers in shifting their attention when needed, by working with, rather than against, features of the game. This advances the existing conversation about designing for families and supporting positive parent-child interactions.

2.3 Normative Dissociation, Attention, and Flow in Online Gaming

Normative dissociation refers to the experience of becoming completely cognitively absorbed in something, to the point that the dissociated person stops processing environmental stimuli other than the stimulus of interest [12]. When in this state of dissociation, higher-order cognitive processes, such as self-reflection and sense of volition, may be lost, as well as a sense of the passage of time [12]. This differs from ordinary attention, in which the context outside of the attentional object remains readily accessible. Butler [12] describes attention as "*observation*," in which conscious awareness remains at a similar level as the attentional object is changed. In contrast, normative dissociation is described as "*absorption*" and "*complete involvement or engagement*." Rather than experiencing a fluid change of focus as with attention, people often realize that they have dissociated in hindsight, accompanied by internal questions of "How did I get here? How much time has passed?" [12].

Flow, a state in which people are challenged just up to the limit of their abilities and must engage their complete attention to achieve peak performance [52], is considered an experience of normative dissociation [11]. Game designers have used flow theory as a guide to create immersive and fun game experiences [15, 18, 19, 40], and researchers have found that "immersion" and "flow" do not substantially differ in video game play literature [49], indicating that both may be experiences of normative dissociation. Wilcox-Netepczuk [68] discusses the impact of realism and perspective on immersion, emphasizing how they enhance the gaming experience. Jennett [38] demonstrates how immersive experiences while gaming are sustained by a person's motivation to continue gaming. Researchers have also found that the immersive nature of video games blurs the distinction between addiction and high engagement [41], as

the degree of immersion while playing video games is strongly correlated with scores of addiction/engagement [41].

Normative dissociation, however, is thought to be a cognitive state that people are inclined to experience many times per day, regardless of the attentional object [11–13]. Butler and Palesh [13] propose that many people engage in potentially dissociative recreational activities, including watching movies, leisure reading, day-dreaming, meditating, and notably, playing computer games. They state that normative dissociation is so widespread “*that its role in our lives has not been fully appreciated or examined empirically*” [13]. Building on these previous studies, we examine whether and how different aspects of digital games may induce dissociative states in gamers, with the goal of promoting child-centered disengagement experiences.

3 METHOD

To more deeply understand if and how children experience normative dissociation in online social game play, and how design may impact these experiences, we analyzed the video-recorded gameplay experiences of seventeen child participants recruited from three collaborating institutions.

3.1 Participants

We recruited participants across three different academic research sites. While each site’s recruitment procedures had slight variations, a combination of flyers, email listservs, and existing participant research pools were used to invite parents of eligible child participants to fill out an eligibility screening survey. This study was advertised as a video game study to better understand how children and adolescents play, experience, and think about online social games such as Minecraft, Roblox, and Fortnite. The screener collected information such as age and gender of the child, parent contact information, games the child usually plays, the frequency with which they play, and zip code. To be eligible to participate, children had to be between the ages of 8 and 14, be fluent in English, and play at least one of Minecraft, Roblox, Fortnite, or another online multiplayer game at least once per week on a platform that supports the Zoom video conferencing platform. Children had to play on a platform that supports Zoom so that we could video record their game play during the interview if they chose to participate.

Of 62 children screened for eligibility, 17 children enrolled and were included in this analysis. These were the first seventeen interviews conducted as part of a larger study in which recruitment is ongoing (goal 60 total participants). Participants were 10 years old on average ($\sigma = 1.3$, $min = 8$, $max = 13$) and included 11 boys and 6 girls (one of whom was transgender). The majority of participants were white ($n = 10$). Three participants reported a mixed race/ethnicity of white and Asian ($n = 2$) or white and Hispanic/Latino ($n = 1$). The remainder of the participants were Asian ($n = 3$) or Black/African American ($n = 1$).

Each participant selected either Roblox or Minecraft to be the focus of their session. Most children played these games by themselves ($n = 13$) or with friends ($n = 13$), with some playing with a sibling ($n = 6$) or parent/caregiver ($n = 2$). The plurality of participants had been playing their selected online multiplayer game for 1–2 years ($n = 8$), with one playing for 5 years or more and one

playing for 1–6 months. The rest had played for 3–4 years ($n = 5$) or 7–12 months ($n = 2$). As shown in Fig. 1, most parents said that they “*usually keep track of what video games my child plays*,” “*have agreed upon rules about what they may and may not do in video games*,” and “*talk with my child about their gameplay experiences*.”

3.2 Procedure

After determining participant eligibility, research assistants (RAs) that were geographically closest to the participant’s zip code scheduled a 30-minute intake phone call, in which the participant, parent, and RA reviewed the consent form and study procedure. At the end of this call, the research assistant scheduled a future 90-minute Zoom interview and gameplay session with the family.

The interview started with a brief review of the study procedures and an opportunity for the parent and child to ask any questions. Research assistants then sent the consent form to the parent for them to digitally sign via the REDcap data management platform and confirmed verbal assent with the child participant. Once confirmed, the interview began. Audio was recorded in addition to video of the child’s screencast and the research assistant’s face. Children’s identifying information, such as name and face, were not recorded.

The interview was split into two parts. During the first part, the research assistant asked questions while the participant shared their screen and navigated their home page, avatar, friends list, and marketplace. The second part of the interview involved questions *in situ* as the child played the video game. We explained that we wanted participants to play as they normally would, with the caveat that our questions might be distracting. Participants were also asked not to interact with other online players during the study.

For the purposes of the present study, we only focus on the segment of interview questions that we asked during the *in situ* gameplay that related to children’s normative dissociation while gaming. We asked questions such as:

- How do you know when it’s time to stop playing?
- How do your mind and brain feel when you are playing?
- Do your parents ever call your name and you can’t hear them when you’re playing games?
- Do you ever realize you are hungry, thirsty, or have to go to the bathroom after gaming?
- Do you forget what time it is or lose track of time when you’re playing?
- How does it feel when you’re really into the game? What happens?
- What gets boring about this game? Can you describe that? What do you do when you feel that way?

Once the interview concluded, we thanked the participant and parent for their participation in our study. We compensated participants with a \$25 Amazon gift card. Transcripts were generated automatically by Zoom and updated for accuracy both manually and via a Python script. We additionally retained audio and video files of the interviews. Our study protocol was approved by the host institution’s IRB.

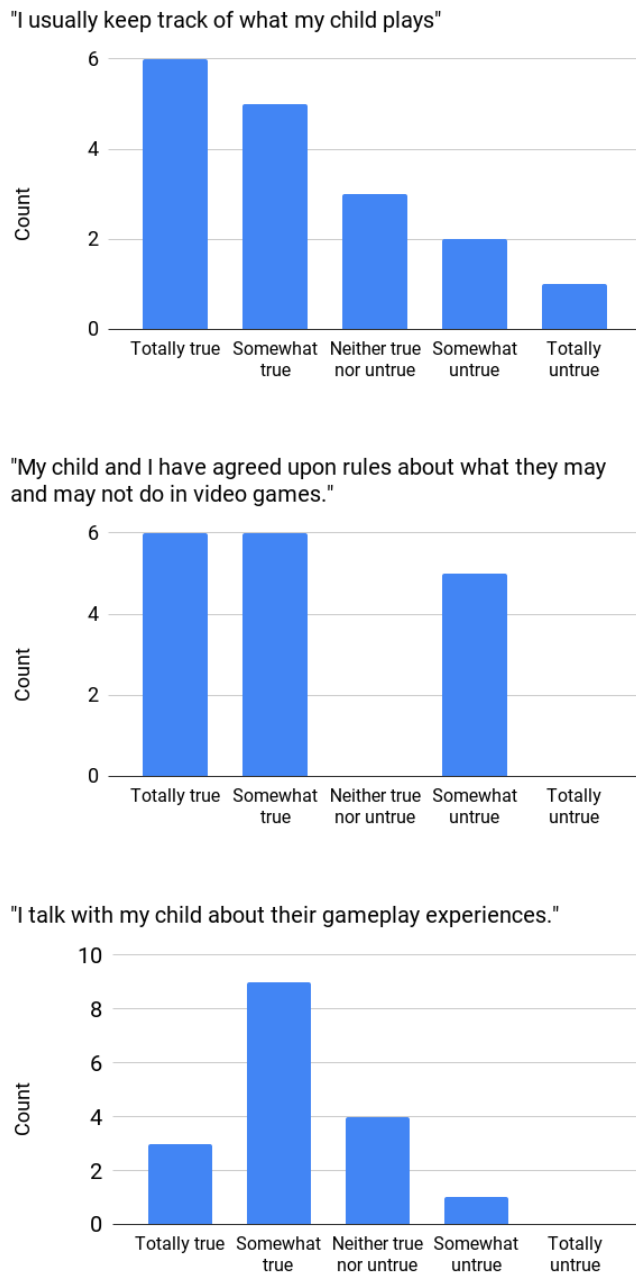


Figure 1: The majority of parents agreed that they keep track of what their children play, have agreed upon rules about gameplay, and they talk with their children about gameplay experiences.

3.3 Analysis

Each of the 17 interviews were roughly 60-75 minutes long and included audio and video data of children's gameplay experiences.

We analyzed the segment of interviews that contained children's descriptions of their game-play experiences to examine whether they reflected the characteristics of normative dissociation. We also analyzed children's behaviors for evidence of normative dissociation in real time as we observed their game play.

3.3.1 Self-Reported Normative Dissociation: Verbal Responses to Interview Questions. First, we analyzed participants' verbal responses to the previously listed questions to determine if they described instances of self-reported normative dissociation. Five researchers reviewed this segment of transcripts while also either listening to the audio file or watching the video at the given timestamps. One RA reviewed all seventeen interview segments, and the other four researchers reviewed a non-overlapping subset of interview segments such that all data was reviewed by two researchers. The research team met at least biweekly over several months to iteratively develop the data analysis approach and discuss findings.

During analysis, researchers pulled quotes in response to the selected questions into separate documents, and began open coding prevalent themes. Next, one researcher transferred these quotes to post-it notes in a virtual affinity diagram on Miro to begin axial coding. Quotes were color-coded by game type, and they were organized spatially by the open codes generated by the five researchers. Four researchers reviewed the affinity diagram and began selective coding. Over the course of several weeks, the research team met, discussed, and refined the codes and their relationships to one another, collapsing and expanding codes through synchronous and asynchronous discussion. We report on our finalized set of themes revolving around characteristics of dissociation in gameplay and end of gameplay (disengagement) experiences.

3.3.2 Observed Normative Dissociation: Video Analysis During Free Play. To complement the analysis of verbal responses, we examined a separate segment of the free play section of the interview to understand children's normative dissociation during gameplay. When conducting this analysis, we looked for behaviors typically associated with normative dissociation: sharply focused attention on the game to the point of absorption, in which children are less able to respond to normally distracting events, such as interview questions [12]. We distinguished this from attention, in which the game may be in the forefront of the mind, but the child is able to easily attend to the interview questions in a fluid manner.

We observed one five-minute subset of each participant's game play, after the child had been in the free play section of the interview for ten minutes (e.g., we had instructed the participants to begin playing as they normally would, while we asked questions in a semi-structured manner). We chose to analyze the free play after ten minutes of play because we expected that the most interruptions and questions would be asked in the first ten minutes, and children may need time to transition into a typical pattern of play. We chose to analyze five minutes of game play after reviewing a small subset of interviews, and determined that rich observations could be drawn from five minutes of play.

Four researchers reviewed and transcribed separate subsets of these five-minute video clips. When transcribing the interviews, we recorded the following information in a spreadsheet: what the researcher had said, the participant's response, and what was happening onscreen. Each researcher-participant paired utterance was

recorded in one row. Each RA then annotated columns to describe whether: 1) the dialogue was related to what was happening on screen, 2) if not, if the participant redirected to what was happening on screen, 3) whether the RA's question was answered, and 4) any additional contextual details.

Once transcribed and annotated, one researcher reviewed 15 transcripts, annotations, and videos. Two of the interviews were not reviewed at this stage due to an error. This researcher open-coded for themes in attention, normative dissociation, and patterns of interaction between the researcher, participant, and on-screen events. Another researcher did the same for 10 transcripts, annotations, and videos. In particular, the researchers looked for evidence that children could attend to distractions from their gameplay (i.e. interview questions) as well as instances when children were sharply focused on gameplay and less able to register and respond to questions, indicative of normative dissociation [12]. We also noted what was happening onscreen in the games when either attention or normative dissociation were present. These researchers met synchronously and asynchronously to discuss and refine themes related to participants' responsiveness and elements of game play. As a result of this analysis, we use these brief dialogues as vignettes, combined with figures that capture various influential elements of game play.

4 RESULTS

Eight of our seventeen participants played Minecraft during the study. Five played in "creative mode" and three in "survival mode." Survival mode requires that participants gather resources and fight enemies, and it has an end goal of beating an enemy boss called the "Ender Dragon." Users must manage their hunger and health as they play. In creative mode, players have access to all resources, and there is no health or hunger bar [2]. All of the other participants played Roblox games, which fell into the genres of fighting ($n = 3$), building ($n = 1$), role-playing game (RPG) ($n = 2$), comedy ($n = 1$), and "all genres" ($n = 2$) [3]. Here, we describe instances of normative dissociation during gameplay, the influence of design on these experiences, and how participants described ending their gameplay and leaving normative dissociation.

4.1 Self-Reported Characteristics of Dissociation during Gameplay

In their interview responses, many of the participants in our study described experiences of becoming deeply absorbed in their gameplay to the extent that they lost track of time ($n = 8$), became deeply focused ($n = 10$), ignored interruption from the outside world ($n = 6$), and stopped paying attention to their internal physical sensations ($n = 8$). These behaviors align with descriptions of normative dissociation, e.g., loss of sense of passage of time and sharply focused engagement on a narrow range of the environment to the point of exclusion of other stimuli [11, 12].

Nearly half of our participants said that they at least sometimes lose track of time when they play games. For example, P13 described how "Sometimes I'm, like, playing, and I think it's only been 15 min. But it's actually been 45 or something, and I just don't pay attention." P9 shared this experience, saying "Sometimes you'll feel like time goes, like, much quicker. Like, okay, the way that I usually get like

device time is, I have to do, like, a math sheet. So, like, 15 min [of game time] for, like, one sheet... and then it feels like 5 minutes, but then it's like, 'oh, man, it's already up.'" P3 also said that time "doesn't feel, like, 'on'" when playing games. P12 said part of this was because "I'm just, like, so excited about what I'm doing."

Other participants had similar experiences to P12, saying that they lost track of time because of how absorbed they were in gameplay. They said their minds felt "active," (P11), "engaged," (P14), "concentrated" (P3, P7), or "zoned out in it" (P13). P9 described how it was "really fun and relaxing" to get deeply absorbed in gameplay "because then you're not thinking about, like, school or anything like that." However, some participants felt like this could go too far and affect them adversely; as P3 said, "if the game is really hard, or if, like, I want to play the game, but I feel like something is wrong, I just go really fast... I feel worried, so I go really fast so I don't have to face those problems." However, this participant clarified "it doesn't happen a lot, really rarely." Other participants said that playing games made their mind feel "relaxed" (P9, P17) and "calm" (P4). P9 explained that how they feel "really depends on the type of game. Some of the games are like speed. Fast. Go as [fast as] you can. Don't fail. And some of the games are like La la, la, la go super, like slow."

4.1.1 Ignoring Internal Sensations. Participants said being absorbed in a game sometimes leads them to ignore internal sensations such as hunger, sleep, or other activities (indicative of normative dissociation, in which environmental cues are excluded from awareness [12]). "I won't notice that it's, like, 11 o'clock in the morning, and that I'm supposed to be having breakfast" (P12). Similarly, P9 said, "I'm going to be, like, playing a video game. It's like, 'Oh, I don't want to get up' or, like, sometimes I'll want water, but it's like, 'Oh, I can't, like, I can't pause this game because it's online.'" However, not all our participants felt this way, and as P1 said, "No, I always do it during," referring to getting water or a snack when needed. Finally, one of our participants explained that when they lose track of time gaming, they "don't have to use any energy, so I have a lot of energy when it's time to go to bed. So that's another problem" (P1). Across the board, these participants described a reduced or entirely absent sense of self-reflective awareness and sense of volition during gameplay, consistent with the experience of normative dissociation [12].

4.1.2 Ignoring External Interruptions. Additionally, many participants explained that sometimes their parents would call their names, and they wouldn't hear them or respond. P9 described how they would sometimes hear their parents calling "very faintly," but they are "too busy play[ing] to like, care," so they end up "kind of like ignoring". They said, "Sometimes they'll like, say something, and I'll just be like, 'Okay,' but then I don't even know what they said. I'll hear a sound. But like sometimes my brain kind of just blocks it out a little bit." P1 agreed, saying, "Sometimes I say, like, 'yes' to something that I didn't want to say yes to." However, not all of our participants felt this way, and some felt confident they "usually snap out of it pretty quickly" (P13) or only don't hear their parents "if I have my headphones on" (P5). P10 said they were "never, like, so into the game where I lose track of other things." This shows that some, though not all, of our participants reported dissociating during game play, while others said that they are able to flexibly attend to outside interruption.

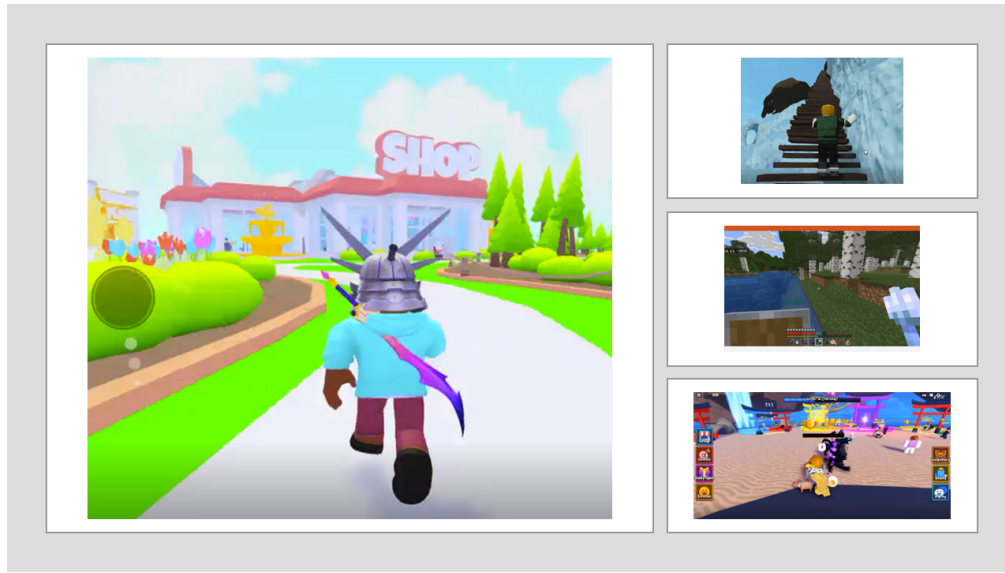


Figure 2: When traveling, participants moved through the game world to get from one aspect of game play to another. While traveling, participants were often engaged and responsive toward the RA asking interview questions.

Research Assistant	Participant (P2)
<i>Do you feel like it takes a lot of focus for you to build like, if I'm talking to you, you can't like, think about what you're doing? Or do you feel like the other way?</i>	<i>It doesn't really take that much focus to build. But I that's probably different with some people.</i>
[4 minutes pass]	
<i>Let's say you were bored and you were done playing the game. Would there ever be something that the game throws at you or something that would make you want to play longer, after deciding you were done?</i>	<i>So, I just renamed this Soulfire Sword, and now you can see it has, like, a cool flame blade.</i>

Table 1: At first, the participant is traversing a Minecraft world (user-paced traveling), and they say it is not difficult to play and answer questions. Then, the participant is selecting a sword from their inventory and renaming it (a tunnel vision component), and they do not answer the question.

4.2 How Design Influences Normative Dissociation

As we observed participants playing their games in real-time, we found that, at times, they were highly responsive to questions from the research assistant and answered promptly, engaged in precise back-and-forth conversation, and elaborated on their replies as necessary. We understood these as instances in which normative dissociation was not present, as participants could easily switch the focus of their attention in these moments [12].

In other moments, participants struggled to respond to RAs or did not respond at all. In these instances, they replied with one-word answers, replied after a delay, trailed off in the middle of a sentence, or were silent while they continued playing, showing no outward signs of hearing the RA's question. We understood these to be instances of normative dissociation, in which participants were so absorbed in gameplay that they exclude or dissociate other aspects of experience [12].

4.2.1 Designs that Reduce Normative Dissociation. We found that the child's level of responsiveness systematically varied with the design of the environment and the child's current interaction with the interface. Specifically, there were two common environments in which children were able to respond richly; we refer to these, respectively, as “user-paced traveling” and “game-initiated pauses.”

User-Paced Traveling. Across almost every game, there were instances in which players needed to traverse their environment to get from one aspect of gameplay to another. These included walking, crawling, running, driving, swimming, and flying, among others (see Fig. 2). Children were able to respond promptly and expansively on a variety of topics while traveling. For example, P9 answered RA questions in-depth while running, on a golf cart, and driving to another building during dialogue. The RA asked, “Remind me what you said your favorite types of games are again?” P9 replied, “I don't really have a favorite. I just like games that are, like, well-made mostly. But if I had to choose. I might- I kind of like a lot of tycoon games. Because they usually made like really thoughtfully.”

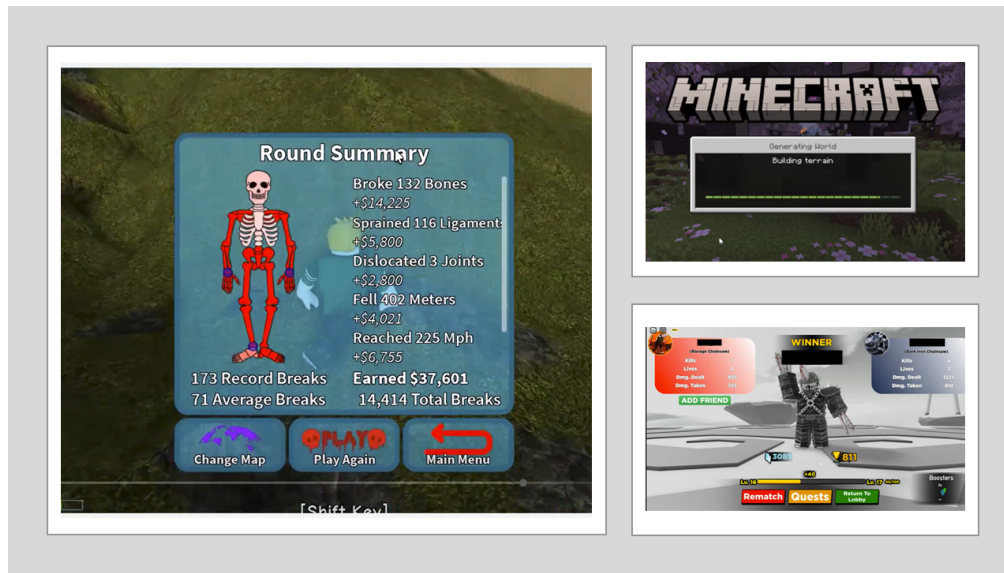


Figure 3: Participants encountered loading screens and were highly responsive to interview questions when this occurred.

But RPs [role-playing games] are also fun. But for most people it just depends on like how they feel like what they want to play.”

Similarly, as shown in Table 1, P2 promptly and precisely responded to a question from an RA about the experience of building in general, and while they did so, they also traversed the Minecraft world. This attentional flexibility may arise from the fact that traveling “doesn’t require a lot of like quick thinking, or like quick movements, or anything like that” (P9). In these instances, users can take their time moving through the game via automatic and repetitive movements.

Game-Initiated Pause. Players encountered pauses due to game functions throughout interviews and were often highly responsive during these times. These breaks happened as stops between levels, loading screens, shifts in the environment, or otherwise waiting for something to complete that does not require their action (see Fig. 3). In the following example, P7 correctly answered a question they initially misheard. At first, P7 was racing in the game, and the RA asked, “Is there anybody following you? I have seen two avatars, who are they?” P7 answered, appearing to have misheard or misunderstood the question, “Well, in some games they like, change your avatar. Like in this game, instead of my usual Roblox skin, I get my penguin skin.” The RA immediately repeated the question during a game-initiated pause, saying, “It seems like there are two friends or people following you, who are they?” P7 then answered, “Oh, yeah, they’re pets. You can get them at your main island, and also here at the pet store.”

4.2.2 Designs that Increase Normative Dissociation. We found that other designs made it less likely that children engaged with the interview or followed the researcher’s lead in conversation. These fell into two primary categories, which we name “tunnel vision components” and “combat and survival.” We found that participants’ normative dissociation increased, reducing their responsiveness

to interview questions, with higher time-pressure, intensity, and stakes of the game.

Tunnel Vision Components. There were many instances in which participants encountered a component that they could open, giving it priority within the interface. These included dialogs, menus, maps, Minecraft’s crafting table, inventories, and sets of options. When users activated one of these components, it became the dominant point of interaction, pausing all other action in the game screen. When participants opened a tunnel vision component, they typically remained highly engaged with the RA, as long as the RA was willing to focus on the component itself. But were less likely to switch topics or pay attention to unrelated questions. Often, the child would walk the RA through the newly opened tunnel vision component, pointing out different things with their mouse, and describing them in detail. For example, in Table 1, this participant ignored a question while highly focused on interacting with their Minecraft inventory, although they had just been responsive to interview questions during user-paced traveling. For examples of tunnel vision components, see Fig. 4.

Combat and Survival. Several games incorporated elements of combat or survival, in which participants would need to fight or run away from an NPC or another player that was trying to attack them. During these times, participants often did not directly engage with RA questions, such as in the case of P14 (see Table 2). During this segment of gameplay, the participant was trying to escape from an NPC that was chasing them in a game that involved survival elements. In this game, they only had one life, and if they were killed, they had to completely restart. The participant verbalized their gameplay, and ignored or superficially responded to RA questions.

Similarly, P5 also played fighting games. P5 both ignored and responded to RA questions, at least superficially, while playing the game. The RA asked, “What does that mean, when you’re on cool downs?” The participant did not respond. The RA then asked,

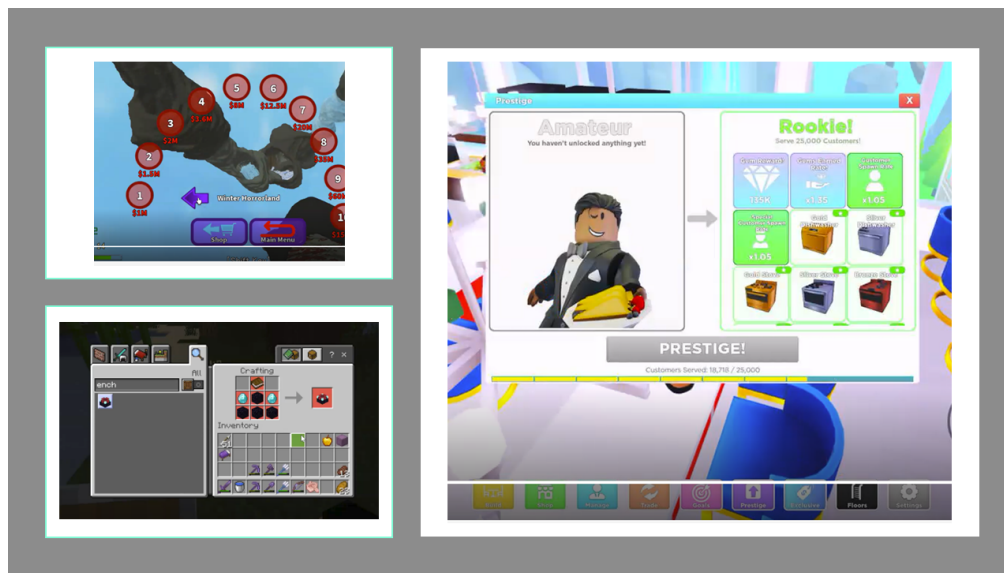


Figure 4: Participants talked to us about various aspects of gameplay, including maps, menus, and inventories. During these instances, participants were highly engaged, but less responsive to unrelated questions.

“And these things that I see on the right-hand side that say, like, ‘left, click, hold right, click?’” P5 then said, *“Oh, yeah, that tells you how to you perform your attacks.”* The RA clarified, *“So it tells you like, which keys to click like your queue, or—”* to which P5 replied *“Yeah.”* Participants were most prone to normative dissociation at these times, as it was critical to their success in-game to avoid being killed in these instances, and their attention was sharply focused on the game and resisted distraction. See Fig. 5 for examples of such interactions.

4.3 Disengagement Experiences

Participants explained in their responses to interview questions that they and their families use a variety of strategies to transition away from gaming. Many participants said they have a parent directly tell them to log off ($n = 6$), or they follow some sort of rule about length of gameplay enforced with a timer ($n = 3$). Another said they use their friends logging off as a cue to do the same ($n = 1$). Some participants said they naturally stop when they get bored ($n = 4$) or just feel like stopping ($n = 5$).

4.3.1 External Interruptions Causing Disengagement. Many of the participants said that their parents ensure they log off, either through direct communication (*“whenever my parents tell me”* (P8)), or via a timer set according to a family rule. P10 explained their timer system, saying,

“Well, we set timers, right? So I have an Alexa in the living room. I usually play in the living room, and... usually I set a timer on it, and then, like, when the timer goes off, [I] get off, you know, the usual... It’s usually my mom who tells me to set a timer. If she says it’s fine to play... then I’ll usually play [more], and then if I get, like, kind of tired of it, I’ll get off.”

P11 also reported having a timer system, which lasted *“usually about the time of one match.”* Another cue to log off was when friends started logging off. As P4 explained, *“Yeah, usually when someone gets off, everybody else gets off. But if there’s everybody’s on, then one person gets off and everybody else stays on. It just depends.”*

4.3.2 Self-Motivations to Disengage. Many of our participants decided to stop their gameplay once they *“get bored of the game”* (P15). P15 played an RPG game on Roblox that involved caregivers taking care of babies. They elaborated that the game gets boring, *“when there’s nothing to do. I’m, okay, I’ve done that already. Another caretaker or the parents are, come to help me, so this game’s been boring, and I will stop playing.”* Others stopped playing *“when my eyes get tired”* (P17), *“[when I get] very frustrated”* (P12), *“when it gets too late”* (P5) or *“when I reach my goal, and probably die”* (P14). In all of these examples, participants described instances in which their awareness of their internal state led them to choose to direct their attention away from gameplay.

4.3.3 Characteristics of Gameplay that Lead to Boredom. Many participants described encountering times of boredom when they play games, an indicator that they are no longer deeply absorbed in play and have exited normative dissociation. When talking about aspects of games that lead to boredom, a participant said, *“when you keep doing the same stuff over and over again, then you just start being really bored”* (P3). That, or when *“there is either nothing worthy to fight, or too many things that are too hard to fight. Because in Genshin Impact, my world will level up and increase the level, and like overall power of the enemies, and so I have to be very careful. And I don’t like being careful. I like rushing in and destroying everything”* (P12). P9 played a tycoon game that involved building a tropical resort. She said that,

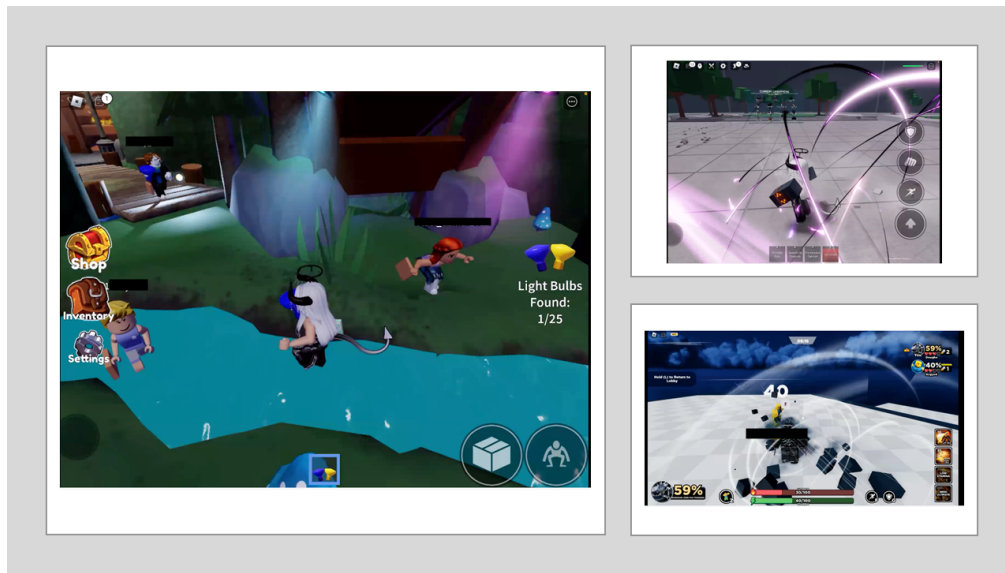


Figure 5: When participants had to fight NPCs or other characters, or had to focus on survival, they were more likely to be deeply absorbed in the game and not respond to interview questions.

Research Assistant	Participant (P14)
Have you ever beat the entire game?	You can do this, you can do that...
Do you have a game plan? What is something you know you need to do to beat this game?	I need to hide. [makes sound effects]
Who is on your team?	Oh, shoot there is blue, there is blue, I see blue.
He can't fit under there, can he?	No.

Table 2: While this participant ran away from something trying to kill their in-game character, they did not answer questions and vocalized their gameplay instead.

"It does get a little boring. Like, it would be a lot of fun if you have money, because, like—the main reason I play is like, to see, like, oh, let's say, like, buy a second floor. What's on the same floor, like, what's happening? I want to see. I want to see all this stuff what's going on, you know? But eventually, if you don't have money, and you're kind of just, like, waiting to get enough money, then the game just kind of becomes, like, just waiting over and over and over and over and over and over until I have enough money."

P17 similarly said that *"Sometimes when you don't know what to build, it can get a bit boring."*

Participants said that when this happens, they either change how they play the game or quit the game entirely. One participant said they *"usually move to [a] different thing, or just do something else, or even like, stop playing video games at all or anything"* (P12). P12 continued, saying, *"I'll just stop and watch YouTube or play a different game."* P9 showed how they would *"usually just, like, leave the game or, like, something. I'll just try something new like, let's say I was bored from like building this [mansion/house] I might just like go over here and like, I have, like some airplanes in the game. So if I*

was bored, I might just go to an airplane and like fly to like, see if I can fly to another island or something like that."

5 DISCUSSION

Across instances of both observed and self-reported dissociative behaviors, we saw children become deeply absorbed in gameplay, to the point of losing track of time and occasionally ignoring outside intrusions. While not all of our participants reported being aware of experiencing these instances of dissociative gameplay, many demonstrated dissociative behaviors during our observational session. Many participants described that when gaming at home, it often feels as though no time has passed when they need to log off. And they explained that it is sometimes difficult to pay attention to cues to log off from their parents or from timers because of how deeply absorbed they are in the game.

One of the advantages of examining children's behavior during gameplay through the lens of normative dissociation is that it provides an alternative to "addiction" for framing children's high levels of engagement with games and their reasons for struggling to disengage from gaming. Although there is widespread societal

concern about gaming addiction, we show that it is useful to differentiate addictive behaviors from dissociative behaviors. Specifically, normative dissociation by *definition* is characterized by suspended self-awareness and volition. That is, once a child becomes deeply absorbed in a game to the point of dissociating, their awareness of their environment and internal sensations will not be restored until something disrupts their dissociative state—either from within or external to the game.

However, our analysis also revealed instances in which children will be less deeply absorbed in gameplay, and their attention will be accessible by interruptions. In particular, *user-paced traveling* and *game-initiated pauses* were opportunities in which children could fluidly focus their attention on both the game and interview questions. In contrast, *combat and survival* and *tunnel vision* components captured participants' attention in a way that indicated normative dissociation was present. These variances in participant experiences led us to brainstorm possibilities for both parents and game designers to create a more collaborative, child-centered disengagement experience.

5.1 Recommendations for Parents: Child-Centered Disengagement

Because of how deeply absorbed children are in their gameplay, and how jarring it sometimes felt to be interrupted and transition, we suggest several potential avenues for initiating disengagement. First, many parents of the participants in our study already took an active role in managing transitions off of games, either by verbally letting children know or setting a timer to enforce a rule. Past work has shown that when parents do initiate disengagement, they look for natural pausing points, such as the end of a video, to do so [37].

Our findings point to two ideal pausing points for parents to take advantage of: *user-paced traveling* and *game-initiated pauses*. In these moments, children's awareness of their surroundings is restored, making them more capable of processing requests and questions from parents and potentially disengaging from the game. In contrast, in moments of *combat and survival*, children are likely to be in a fully dissociative state and oblivious to parental input. When a child is engaging in tasks in a *tunnel vision component*, they may be too engrossed to easily switch topics, yet eager and able to share their experience with a parent.

5.2 Recommendations for Designers: Parent-Child Collaborative Disengagement

Our findings suggest designers can create better disengagement experiences by leveraging the predictable ways in which children cycled in and out of dissociative states in response to specific game designs. First, designers can allow parents to *enter the child's attentional sphere*. Rather than interjecting from the outside, the parent can use a simple interface to temporarily enter the world in which the child is deeply absorbed during normative dissociation. This could provide an opportunity for the child to share something about their game world before leaving it (much like they might show something to a parent who arrives at school or a friend's house to pick them up). This would require a more active role on the part of the parent during the disengagement experience. However, it would provide an opportunity for parents and children to

bond over a shared experience, and for parents to meet the children within their gameplay to help them transition. For example, in the case of the participant in our study who played the care-taking RPG, the parent and child could collaboratively put the child's avatar to sleep.

Second, designers might create parental controls that *make parents aware of moments of or interrupt game play during user-paced traveling or game initiated pauses*. Current parental controls primarily center around options for social interaction online and prohibiting access to certain content on Minecraft and Roblox [1, 29]. And tools to facilitate disengagement typically interject based on time alone. Rather than interrupting children at random, games might ask a child to disengage or notify a parent that a child is at a good stopping point when they reach a point in the game design where they are less likely to be dissociated. This would provide an opportunity to intervene at moments of user-paced traveling or game-initiated pauses.

Third, designers can strategically *manufacture regular occurrences of non-dissociative design*, particularly by building in more or longer game-initiated pauses. Children will be more capable of self-regulating their own use and more responsive to regulation from parents in moments of gameplay that are less likely to induce dissociation. By ensuring these occur at regular intervals, designers are more likely to interrupt continued absorption, to return the child's self-awareness to them, and to give them greater autonomy over their decision-making. Parents and children could collaboratively instruct the game to set the frequency of these moments of non-dissociative design. Or, as part of parental controls, parents could ask the game to manufacture a moment of non-dissociative design within the next five minutes and to notify the parent when the child has entered that scene. Prior work shows that designers of children's technology are critical of how current game designs hijack children's attention [39], suggesting an interest among practitioners in exploring this space.

Finally, practitioners of child-centered game design and development may find our results useful for aligning the design process with experiences of normative dissociation. For example, when setting up an evaluation or observation of children's interactions with games, researchers may benefit from asking questions or pausing the study during *user-paced traveling* or *game-initiated pauses* rather than *combat and survival* or during interaction with *tunnel vision components*.

LIMITATIONS

One notable limitation of our study is that we could only rely on our participants' verbal responses to our interview questions when assessing if normative dissociation was present, as we did not have recorded video of the child's face. This limited our ability to see how much children may have been attending to or ignoring other stimuli in their immediate environment. We also did not interview the parents of our participants regarding family interactions around gaming and transitions off of screen time. This was an intentional choice because we wanted to center children's experiences and agencies in our study, but also gives limited perspective into how gaming fits into the broader landscape of the family. Finally, our sample was restricted to children who play Minecraft and Roblox.

Inclusion of a broader genre of games would likely have broadened our findings regarding how features of games impact children's experiences of normative dissociation. This is an opportunity for future work to explore.

6 CONCLUSION

In conclusion, both children's self-reports and our observations reflect indications of children normatively dissociating during online gameplay. In these instances, children lose track of the passage of time, become deeply absorbed in the game, and exclude other stimuli from their attention. We find that the features of games have an influence on moments of normative dissociation. Namely, moments of user-paced traveling and game-initiated pauses allowed children to more readily attend to stimuli outside of the game. Conversely, instances of tunnel vision components along with combat and survival were accompanied by more behaviors characteristic of normative dissociation. Children were able to verbalize their gameplay, but less responsive to interview questions in these instances. Because so many children lose track of time and rely on their parents to know when to stop playing, we recommend that designers expand options for parental controls to include collaborative planning with their child for time spent gaming. In particular, we recommend that these parental controls intervene in moments of game-initiated pauses or user-paced travel, as these will likely allow for an easier transition for players. It is our hope that these findings empower parents, designers, and children to enjoy gaming as part of a balanced online and offline life.

SELECTION AND PARTICIPATION OF CHILDREN

Our interview and observation were conducted with children recruited from three academic and pediatric research institutions. Each participant's data was collected in a 90-minute max interview session, preceded by a call with the parent or guardian of the child, in which the child had the option to attend. Participants were recruited using a variety of methods across the three sites, including a database managed by the authors' respective institutions, email listservs, and flyers, which invited parents of children who play video games to take an eligibility survey. Once we identified eligible participants, parents were provided with information sheets with details of the research. We then scheduled a consent form review call, during which we described each section of the consent form, gave an opportunity to ask questions, and informed the potential participants that we were mandated reporters. We also detailed our data privacy and security plan, in which we would not capture children's face or name, and these identifying details would be stored separately from the study data. We informed parents that their child's de-identified data, such as screenshots of gameplay, may be used in publications. We informed parents and children that they could pause or end their participation at any time. We ensured that we received parental consent before beginning any study procedures, as well as confirming verbal assent with the child participant. All procedures were reviewed and approved by the lead institution's IRB, and this approval was coordinated across institutions through IRB reliance agreements.

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