

# It Is Complicated: Interacting with Children in Social Virtual Reality

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## ABSTRACT

Social VR refers to 3D virtual spaces where multiple users can interact with one another through VR head-mounted displays. These novel digital spaces are dramatically transforming how people meet, interact, and socialize online and have attracted users of different age groups and maturity levels. This variety sometimes leads to less desirable interactions, tensions, and frustrations between different user bases (e.g., adults and children). Based on 30 interviews, we focus on how people perceive and experience interacting with young users across various social VR applications. We aim at better understanding the complex social interaction dynamics afforded by social VR. We also discuss potential design implications toward a more child centered design for future social VR platforms.

**Index Terms:** Human-Centered Computing—Social VR—Children;

## 1 INTRODUCTION

Social Virtual Reality (VR) is increasingly becoming an emerging online social ecosystem where multiple users can interact with one another through VR head-mounted displays in 3D virtual spaces [14, 15]. In these online social spaces, various users engage in cultivating online social relationships, exploring immersive virtual worlds, and enjoying VR gaming. Such a diversity and richness of these activities afforded by social VR has attracted users of different age groups, and particularly a large amount of young people. For example, children and adolescents have been reported to be noticed across different social VR platforms due to either a relatively shorter avatar [4] or a particularly high pitched voice.

This emerging phenomenon has led to a number of new questions, such as: what are common social interactions experienced by young people in social VR? *And how do adults perceive and understand young users in social VR?* It also causes a variety of ethical and privacy concerns as young people may experience problematic online situations in social VR, including but not limited to interactions with online strangers, requests for personal information, and misunderstood communication [20]. Therefore, answers to these questions are not only important to better understanding the complicated social dynamics that are supported and facilitated by social VR but also can inform the design of future social VR as safer online spaces.

However, the majority of prior scholarship on young users in VR has focused on medical [1, 18, 23], experimental [21], or educational settings [12, 22]. Yet little is known about the experiences of interacting with young people in commercial social VR settings. In this paper, we endeavor to explore this open space by discussing how young people are perceived and understood in social VR, safety concerns for them in social VR from adult users, and design implications for creating safe and comfortable social VR spaces for both children and adults.

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## 2 RELATED WORKS

### 2.1 Children and Virtual Reality

Investigation into children and VR has revolved largely surrounding two contexts, medical and educational. For example, previous studies have suggested that VR is effective for children to manage pain through gamification and the emergence of remote health-care [1, 8, 18, 23]. However, it is important to note that these studies did not include any social aspect. Rather, they were experimental investigations with a sole user.

In the area of education, VR as a tool has been shown to help children develop cognitive skills and abilities. For example, Vogel et al. developed an application to teach the hearing-impaired [22] and Loiacono et al. created a game to enhance social skills with children with neurological disorders [12]. Other studies aimed at understanding how children learn and collaborate in VR. Roussos et al. created a narrative-based, immersive, constructionist/collaborative environment and yielded three design recommendations for how to create effective VR educational simulations for children: 1) focusing on deep learning problems, which require the rejection of inadequate and misleading models based on everyday experience; 2) The learning goal must be plausibly enhanced by the introduction of immersive VR technologies; and 3) VR-based learning environments must be informed by contemporary research in the learning sciences [17].

Collectively, this body of research has explored VR as a tool to assist children mainly in experimental settings. Yet few studies focus on what young people do and how they are perceived in VR, which raises various ethical concerns [21]. In addition, with the emergence and ease of accessibility to consumer social VR applications (e.g., *AltspaceVR*, *RecRoom*, *VRChat*), there is an urgent need to understand the new phenomena and challenges for children brought by commercial social VR applications.

### 2.2 Children and Virtual Worlds

In addition to VR, a body of research has also explored how children use virtual worlds. Virtual worlds in the form of Multi-User Domain Object Oriented (MOOs), and Massive multiplayer online role-playing game (MMORPGs), and open-ended digital social spaces have been used by children since the late 90s [5]. In recent years, many virtual worlds have been designed specifically for children. Examples include *Neopets*, *Barbie Girls*, and *Club Penguin*. These worlds tended to focus on playful designs and child-centric activities, including imitative role play, make-believe with objects, and make-believe with actions and situations [13].

Like any other online platforms, unwanted activities such as harassment may still occur in these virtual worlds that were designed for children, which raises safety concerns for children who engage in these worlds. Nonetheless, they have been generally perceived as safer and preferred by parents as oppose to traditional online gaming (*World of Warcraft*). For example, Marsh mentioned parents saying “*I let my kids use Club Penguin and i think its perfectly safe*” [13]. Issues regarding identity construction have also emerged as a important research agenda regarding children and virtual worlds. For most children, engaging in a virtual world may be the first time when they can control an avatar. In this process, they have the opportunity to construct, re-construct, and learn how to perceive themselves and others in an online world [13].

However, the majority of prior research in this area focuses on virtual worlds where children interact with other children. Little is known about how mixed virtual environments (e.g., social VR) where children and adults co-exist in virtual worlds, and how this can shape children's relationships with virtual worlds.

### 3 METHODOLOGY

This research is part of a broader investigation on social experiences in social VR. Participants were recruited via popular online social VR forums (e.g., Reddit-RecRoom, Reddit-AltSpaceVR, and Reddit-VRChat). We also directly recruited participants by entering popular social VR spaces (e.g., *AltSpace* and *VRChat*). All participants who responded to our requests and agreed to participate were interviewed. As a result, we conducted 30 semi-structured in-depth interviews via text or audio chat through Discord, Skype, or Google Hangouts from October 2019 to November 2019. The average length of interviews was 60 minutes.

Among the 30 participants, twenty-one are cis male, five are cis female, and four are trans women. Of the 29 participants who shared their ethnicity, 20 are White, two are Black, five are Asian, and two are Hispanic. Participants aged from 18 to 65 (average age: 32.2) and with diverse experiences of social VR ranging from 5 months to 36 months (average: 18.7 months). Participants had also experienced a variety of popular social VR platforms including *Rec Room*, *VR Chat*, *AltSpaceVR*, *High Fidelity*, *Facebook Spaces*, *Vtime*, *Engage VR*, *Mozilla Hubs*, *Sonoroom*, *Pokerstar*, *Oculus Rooms*, *Sansar*, *Anyland*, and so forth. Our interview questions focused on participants' social interactions, activities, and social experiences in social VR. An important note is that there were no direct questions about interactions with children or adolescents. However, experiences, tensions, and frustrations when encountering such users emerged as one of the main themes in our data. This interesting phenomenon, therefore, led to the research questions that we proposed at the beginning of this paper.

We used an empirical, in-depth qualitative analysis of the collected data to explore our research questions [7]. We closely read through the collected data to acquire a sense of the whole picture and collectively identified thematic topics and sub-themes. We then collaborated in an iterative coding process to discuss, combine, and refine themes and features to generate a rich description.

### 4 FINDINGS

Using quotes from participants' own accounts, in this section we present three key findings emerging in people's perceptions and experiences of interacting with children and adolescents across various social VR applications.

#### 4.1 The Complexity of Interacting with Young Users in Social VR

Our participants noted both positive and negative experiences of interacting with young users in social VR. They highlighted the complexity of how to perceive and interact with these users in a social VR environment: 1) young users were on most social VR platforms and were inherently part of the user base; 2) immature or naive behavior were understandable and expected, though they may lead to tensions and frustrations in online social interactions; and 3) interacting with young users, especially when they were family members, could be an enjoyable experience that supported and improved family relations.

**Young People as Essential Social VR Users.** Participants acknowledged the essential role of young people in the social VR ecosystem. They also considered young people to be the majority of users on particular platforms such as *RecRoom*. For example, P12 (Cis Male, 49, Asian), P14 (Cis Male, 32, Hispanic), and P26 (Cis Male, 30, White) all mentioned: "a lot more kids in rec room" (P12), "rec room one is also filled with kids" (P14), and "on rec room there

is a large amount of kids". Some participants pointed out that *RecRoom* may attract a large number of young people due to its focus on play and games. Although games are prevalent on social VR platforms, other areas of activities include part taking in workshops, collaborating in a virtual spaces, embodying different avatars, and doing VR specific activities are all appealing to both adults and younger users. For example, P20 (Cis Male, 20, White) explained, "as opposed to online multiplayer games, I think it [social VR] is still kinda niche, and people really want it. Even the young kids, they're interested in it." According to P20, social VR being a relatively new and novel social platform provided meaningful experiences that were different but similar to the real world. The differences and similarities are made up of a fusion of offline physics and first person perspective coupled with online features such as ease of accessibility, imagination, and other online specific affordances. This unique fusion of affordance inevitably attracts both adults and young people, which creates an interesting social dynamics between these different user groups.

#### The Prevalence of Immature or Naive Behavior in Social VR.

As mentioned above, this new online social dynamic afforded in social VR further blurs the boundary between the offline world and virtual worlds compared to traditional virtual worlds such as *SecondLife*, *Runescape*, and *Club Penguin*.

In this context, it is more likely and natural for young people to demonstrate immature and naive behavior in a more immersive, vivid, and rambunctious way. The prevalence of such behaviors in social VR, therefore, can be unwanted and annoying to more mature users. P22 (Cis Male, 32, White) shared his experience, "kids in social VR often run around and scream. It's just irritating." P14's story also echoed this sentiment, "so there's something that that happens quite a lot and most with with when there are kids, and it's that they try to break the game, when they tried to break the game and I don't know get super tall or super short or the floor or just start screaming and doing silly stuff." However, some other participants expressed understandings and tolerance toward these behaviors and did not find interacting with young people frustrating. For them, these immature and naive behaviors were merely a natural part of their social VR experiences. P11 (Cis Male, 21, White) explained, "most people that I've encountered in social VR are just kids. So they interact in any kids' way. They're loud and obnoxious. They just behave like kids. For example, they do things for attention and make noises. They do not bother me. I never get off [social VR] because of an unpleasant social experience with kids". For P11, he understood that children were just children. Specifically, he pointed out that part of joys of youth was being able to explore and interact within social VR in their own ways.

#### An Enjoyable Experience to Improve Family Relations.

For some participants, interacting with young people in social VR was an extremely enjoyable experience, particularly when those young people were their family members. P27 (Cis Male, 45, White) told us that since he was disabled, interacting with younger family members in social VR was an extremely rewarding experience: "I'm in social VR with my family, such as younger nieces and nephews. We all just watch movies and play games together. Or I just go in there and talk to them." For P27, without the physical efforts to leave the house, he could take advantage of the various activities supported by social VR to maintain and support bonding and ultimately feelings of closeness with his family members, which would be more challenging for him in the offline world as a disabled user. In addition, P26 (Cis Male, 30, White) commented on using social VR platforms with his own children: "I do enjoy playing with my kids all the time and I can imagine when they are in college we can meet up to see each other and have a chat." Others also shared similar stories. P13 (Cis Male, 46, Black) noted, "Occasionally I play with my kids in social VR. It is more of a friendly and inviting environment." For both participants, social VR seemed to transform the relationship dynamics with their

own children. For P26, though his children and him may not be physically co-located, the presence and richness of interactions could still be experienced through the social VR technology. According to P13, social VR appeared to foster a more friendly and inviting atmosphere that both his children and him enjoyed.

In summary, these quotes collectively depict adult users' experiences with young people in social VR. Despite some negative and frustrating interactions, participants who had relational ties to children and adolescents in fact found that experiencing social VR with young people was an rewarding and enjoyable intimate experience, which may create and reinforce strong family connections.

## 4.2 Safety Concerns for Young Users in Social VR

As adults regarded their interactions with children and adolescents in social VR as complex social experiences, they expressed various safety concerns for these young users, ranging from harassment and privacy, exposure to negative social environments, and excessive use.

**Harassment and Privacy.** Like any other online platforms, harassment is emerging as an important issue in social VR platforms [4]. Our participants noted that children and adolescents were often easy targets of harassment from older users. P20 (Cis Male, 20, White) described his concerns when asked about harassment: *"not so much to me, I wander around and don't modulate my voice. But the female avatars and the kids get harassed a lot, they get called squeakers. I tell my friends that I wish social VR had come out when I was younger. But I'm so glad it didn't, because I would just have a terrible time because people would be mean to me all the time because I'd be a little kid. It's really rough for the kids in social VR."* According to P20, women and young people are often considered part of the marginalized community in social VR: children are made fun of or called as "squeakers" – a derogatory term that mocks their unique voice before they reach puberty. P14 (Cis Male, 32, Hispanic) also raised concerns about young people's privacy: *"my concern is that young people often get too personal on the first introduction. For example, I could say, 'hi, what's the name of your teacher?' and they would just tell me such information."* In P14's account, a major safety concern for young social VR users was that they did not understand how to protect their privacy online, how much information they could share, and how to set up appropriate boundaries with online strangers in social VR.

**Exposure to Negative Social Environments.** Others also shared concerns about how young people in social VR were inevitably exposed to negative or even hostile social landscapes. For example, P4 (Trans Woman, 32, White) worried about the profanity use in social VR: *"it's still a little bit like the wild wild west out there. And by that I mean that it's largely unchecked. When people are talking in chat or using foul language, you can hear their voice. And you're like, that's probably not a kid older than 14 or 15. And you know, if you've ever seen little kids who were just nasty to each other, it's the Internet. It's their first time, and they have literally no consequence"*. This quote raises highlighted an important but troubling fact that social VR may be a child's first experience of online social spaces nowadays. While such an experience can be felt as exciting and exploratory, they often lack necessary guidance from parents or peers to understand ethics online. As P4 noted, without fully understanding the ethics and norms of online social spaces, young people may inevitably be exposed to negative social environments such as foul language and inappropriate social behaviors.

**Excessive Use.** Another safety concern focuses on how often children and adolescents are using social VR. P22 (Cis Male, 32, White) pointed out, *"usually screaming, you get that a lot in rec room cause there's a lot of kids. I guess I can't believe these kids have VR. If I had that when I was a kid, I would've failed school. Maybe in small doses it's fine. But you could tell a lot of these kids are playing it for six or eight hours a day. I'm not sure that's probably the best*

*for them.*" For P22, young people's excessive use of social VR made him worried about their health and academic performance. While most adults may not have the flexibility to spend large amounts of time in social VR, some children and adolescents seemed to be addicted to social VR. For many adult users, the duration of the time that young people spent on these platforms was an alert – would such an excessive use may limit their development in other critical areas such as education, physical activity, or social maturity from being around their peers?

These concerns also led to some participants' reflections on how to refine safe online social spaces for young people. For example, P1 (Cis Male, 19, White) noted that a more careful regulation of junior accounts could be a solution: *"I'm not sure how they can make sure kids use junior accounts. You can report people for being under 13 but it doesn't usually do anything."* For P1, the key issue was that in social VR, children and adolescents encountered social interactions far beyond their maturity level while the current features employed to protect them were ineffective. This dilemma allowed young people and adults to co-exist in the same online social spaces where they would not normally be in, which may create certain awkward and unwanted social dynamics. P2 (Cis Male, 23, White) described this situation as: *"I mean there are age differences in social VR. I remember when I was eight years old, I would just go up to people online and say 'do you want to be my friend?' But now if I saw a kid [in social VR], I wouldn't want them to come up to me to say 'oh, we're going to be friends.' and right now in social VR there are lots of both adults and children. There's a point now where these two groups approach people and making friends becomes awkward."* Obviously, such social interactions can provide feelings of uneasiness for adults and potentially unsafe interactions for young people.

## 4.3 Expectations for More Catered Social VR Experience

As we have shown, our participants often noted that social VR platforms tended to situate users of different ages within the same digital social spaces. As a result, many also expressed expectations and a strong demand for creating separate spaces that could better cater to different age groups.

P22 (Cis Male, 32, White) further explains such a demand: *"I was looking for things that I could play. I found rec room and played some of the games. I really enjoyed it. But I didn't really stick with rec room because it's mostly like kids and they're kind of annoying. Then I found altspace. I really kind of fit in better there. Altspace is more mature while rec room is mostly for kids."* P22 clearly expressed his frustration and unsatisfying experiences of being in the same social space with young people (e.g., *RecRoom*). He left *RecRoom* due to the feeling of displacement though he enjoyed the actual content that this platform provided (e.g., gaming). For him he "fit in better" in *AltspaceVR* rather than *RecRoom* because of the level of maturity around him. The level of maturity may come from the content that *AltspaceVR* offered such as professional development activities, meetups, and concerts. These events are often more appealing to adults than children. This observation, therefore, lead to an interesting question: how can different social VR platforms carefully design the content that they offer in order to create more catered social experiences for different age groups?

Other participants also shared their thoughts regarding age appropriate social VR spaces. For example, when asking P26 (Cis Male, 30, White) why he preferred *AltspaceVR*, he said, *"Altspace has things you can do and be productive and the community is much nicer and supportive. In contrast, in Anyland or VR Chat, you get more people screaming and younger kids."* For P26, a sense of supportive community was valuable and meaningful for adult social VR users and the key to attract and retain them. Yet such a feeling may not be considered important for young people. In this sense, it is

crucial for social VR platforms to foster different social atmospheres to cater to different age groups.

Especially, for some participants such diverse social experiences across different social VR platforms was what they enjoyed most. P12 (Cis Male, 49, Asian) reflected, “I like Bigscreen just because it allows me to do things like watching a game or having a conversation over movie with friends who are far away. I like RecRoom because it has a social component and has the best games though it also has many kids. I’m a little more apprehensive about VR Chat. It has more adults but your experience is dependent on which room you end up in.” In this quote, P12 highlighted how that each social VR platform had different aspects that people may enjoy, and that it was important for people to have a wide range of choices in content, entertainment, and user base as they collectively contributed to an enjoyable social VR experience. In summary, though some platforms employ certain design features to differentiate between adults and minors, these strategies were rather ineffective as P1 and P4 pointed out in previous sections. How to accommodate users’ expectations and demands for a more catered and age appropriate social VR experience, therefore, requires more research.

## 5 DISCUSSION AND FUTURE WORK

In this study, we have highlighted three main findings. First, young users in social VR constituted an inherent part of the social experience, which included both positive and negative aspects of their behaviors. Second, adults showed major concern for young people in this novel online social ecosystem, including harassment and privacy, exposure to negative social environments, and excessive use. At last, it was important to design separate social VR spaces which could better cater different age groups.

**The Importance of Children for Future Social VR Technologies.** Our findings demonstrate that children are particularly noticeable on social VR platforms. This work represents one of the first empirical studies to highlight the important role of children in commercial social VR platforms. Compared to adult users, children and adolescents seem to have more freedom and time to explore social VR. As diverse social VR platforms become increasingly popular and more accessible, it is plausible that the population and influence of younger social VR users will continue to grow. This emerging phenomenon may follow other similar technology trends (e.g., social media use), where younger users were the most likely to use social media [16]. It is important for VR researchers and designers to take the growing population of young VR users into account when developing future VR technologies/platforms.

**Online Spaces for Children and Parents.** Our findings confirm and extend previous findings on children’s online behavior with regard to harassment, privacy concerns, negative social exposure, and excessive use [3, 10, 11, 19]. Prior literature has also discussed ways to combat these negative aspects for children’s online social lives. Specifically, Cook discussed how an online environment where both parents and children could co-exist and co-consume content could help alleviate these negative experiences for children [6]. This is important because parents and guardians have been noted to be unaware of the kind of social and cultural worlds that young people are creating online [9]. Our adult participants also suggested that this co-existence may be one reason why they enjoyed playing with their children in social VR. A focus on designing this co-experience in future social VR platforms, thus, may create more comfortable and safer social experiences for both parents and children.

**Designing Social VR Spaces for Children.** Based on our findings, we also endeavor to highlight potential design implications for social VR spaces for children. One implication focuses on a target age group, as each group has their *own unique developmental needs*. Age groups are generally separated by young children (under 5 years old), children (between 6 and 10 years old), tweens (10 to 12 years old) and teens (13 to 18 years old). The idea of targeted

age group was reiterated by Beals and Bers describe six important design features for creating virtual worlds for children and youth: *purpose, communication, participation, play, artifacts, and rules* [2]. Depending on the particular age group, one of the six design features maybe of more value than the other. For example, purpose for teens revolves around “identity”, while purpose for a young child should mirror their “real life goals.” In addition, another implication emphasizes a framework of *affordance, interaction, and content*. As Southgate et al. pointed out, special affordances of the technologies, modes of social interaction within the environment, and content in the environment should be used to evaluate the developmental appropriateness of any immersive environments for children [21]. As our findings have shown, the novel affordance of social VR, the complicated interaction dynamics that it supports, and the diverse content and activities that it provides have collectively constituted both challenges and opportunities to create nuanced online social experiences for children. How to better balance and manage these three aspects in designing and developing future social VR, therefore, opens a new research frontier.

**Future Work.** One limitation of this study is that we only interviewed adults about their perceptions and interactions with children in social VR. Built upon this study, our future work would involve interviewing children to get their perspectives and understandings of experiencing social VR. More research is also needed to identify strategies and methods to combat harassment in social VR, primarily towards children. In addition, our future work would continue to explore design implications for creating more socially equitable spaces.

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