Supporting A Safe and Healthy Immersive Environment for Teenagers

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Abstract

Immersive technologies, such as social virtual reality (VR), can revolutionize how people interact with each other, blurring the boundary between the online world and the physical world. However, the dynamics of potential online child sexual exploitation and abuse (CSEA), the norms of a safe immersive environment, and how teenagers navigate themselves through these situations are still understudied. We aim to investigate teenagers' experiences and offenders' digital pathways that lead to online CSEA through immersive technologies to inform their future design. This research goal is to enrich the understanding of CSEA in the evolving immersive technologies context and to provide insights and guidance for creating safe and healthy immersive environments for teenagers.

Research Background

Online child sexual exploitation and abuse (CSEA), also known as "Cyber Molestation", is a type of online abuse that may involve grooming, live streaming, producing and consuming child sexual abuse material, and coercing and blackmailing children for sexual purposes [1]. CSEA not only scars those children who have experienced the abuse physically and mentally, but also haunts their family members with significant feelings of risk and insecurity [2]. Additionally, children's inability to identify risks, the potential for re-victimization, and its long-term effects can significantly increase the impact of CSEA [3, 4]. However, existing research on CSEA, although abundant, rarely accounts for the recent technological (e.g., immersive technologies) and societal environments (e.g., children's longer online exposure due to the needs of remote learning and social interaction). The focus of this research is CSEA in immersive technologies, i.e., technologies that blur the lines between the physical and virtual worlds, create a sense of immersion, and enhance the realism of virtual experiences [5, 6].

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Compared to other traditional online platforms (e.g., gaming and social media), the blurred boundary between reality and fantasy in an immersive environment through VR devices create many difficulties for children to properly navigate through the virtual world including making them more vulnerable to harassment [7]. The blocked-off personal experiences (i.e., only the users who wear the VR headset can see the content) also forbid their parents from understanding their children's experiences in VR because they cannot see who their children are interacting with or what they are doing. These risks, unfortunately, are being exacerbated by the trend where the usage of VR and other immersive technologies among children is rapidly rising and more accessible including through VR headsets and desktop computers. For example, Roblox, one of the most popular VR gaming and social platforms, claims that two-thirds of all U.S. children between 9 and 12 years old use Roblox and one-third of all Americans under the age of 16 [8]. In the meantime, however, the safety measures in these environments have not been standardized. While a few VR platforms are taking measures to ensure a safe environment for children (e.g., Roblox filters inappropriate languages and behaviors [9]), many do not have such policies in place. One example is Oculus which only restricts children under 13 from having an account [10]. The norms, the guardrails, and the authorities are unclear and may still be in development with this new environment.

In this research, we focus on one specific type of immersive environment, social VR. Social VR refers to any commercial 3D virtual environment where multiple users can interact with one another through VR head-mounted displays [11, 12]. This includes platforms such as AltSpace, VRChat, RecRoom, and Roblox. Social VR includes significantly more interactions in various formats, making CSEA more likely to happen. Yet, the unique user experiences in social VR (e.g., full-body movement through a 360-degree virtual space in real-time [13]; spatial and temporal interaction; verbal and non-verbal communications [14], etc.) make it more attractive to teenagers compared to traditional social

platforms. Thus, teenagers may face higher risks of CSEA in social VR. Our research aims to 1) enrich the understanding of CSEA in evolving social VR contexts, 2) identify norms in social VR, and 3) provide guidance for combating CSEA and designing safe and healthy social VR for children.

Technology-Assisted CSEA and Existing Effort to Combat CSEA.

Child Sexual Exploitation and Abuse, or CSEA, has been consistently shown to have a profound impact on children's mental and physical health (e.g., anxiety, distress) as well as the development of their sexuality and social functioning both in the short term and long term [15]. With the development of modern technologies, technology usage in CSEA has been related to many prevalent cases of child abuse, such as viewing or uploading indecent images of children on the Internet and other child sexual abuse materials (CSAM), some of which may not always be visual, such as text, or more broadly, child pornography [16, 17, 18], cyber-bullying [19, 20, 21], and cyber grooming [22, 23, 24]. Moreover, technologies may also make it easier to initiate, escalate, and maintain abuse in various contexts [25, 26, 27], such as mobile phones [28], social media [26, 29], and gaming [30, 31].

To combat CSEA and support a safe environment for the next generation, numerous efforts have been made. On the technology side, many technology companies have designed and implemented various mechanisms to detect, prevent, and report CSEA [32, 33, 34, 35]. Research has also demonstrated the possibility of using other computational approaches for risk detection to support children's online safety, such as machine learning and artificial intelligence [36, 37, 38, 39, 40, 41, 42]. On the social side, educational materials and external support have been widely applied to keep teens informed of the potential risky situations and possible actions to take. Researchers also study other ways to encourage teens to take action, such as through peer pressure [43].

VR as a Social Space.

In the context of social VR, users can create their avatars in the virtual space, then interact with others using their body gestures through full-body tracking (i.e., the body movement of a user's avatar corresponds to the body movement of the user in real-time). In a typical social VR context, a user can have social interactions as they would do in their real lives. For example, users can walk with others in a park, play basketball on a basketball court, or watch a movie in a movie theater. Because of the real-life experiment, social VR creates a strong sense of embodiment [44] compared to traditional social media or games where users control their characters using a mouse, a keyboard, or joysticks. Research on social VR has been focused on design methods and approaches [45, 11, 46], interpersonal communications and interactions [47, 14, 12, 48, 49], long-distance couple's interaction experiences [50, 51, 52, 53], privacy concerns [54], etc. In particular, some research focuses on children's perceptions of social VR [53, 52]. However, they also need to deal with the harassment and bullying that came from other minors. Similarly, when adults were involved in the social VR, minors also needed to deal with the possible inappropriate content posed by the adults [52].

The proposed work attempts to investigate CSEA in social VR and aims to derive design guidelines and norms for safe and healthy immersive technologies at large. This research will have a significant and positive societal impact by helping address an important issue related to child safety in emerging technologies. Our simulation approach and ExpVR will enable future research to continue to explore other opportunities to combat CSEA, such as in-situ anti-abuse education and nudging without exposing children to risky situations.

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