Supporting Teen Online Safety in Social VR: Towards Building A CSCW Research Agenda for Embodied, Spatial, and Avatar-Mediated Risk in Virtual Spaces

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Abstract

Social virtual reality (VR) is becoming an increasingly important online social space for teens, supporting immersive play, identity exploration, peer connection, and creative expression. At the same time, teens encounter various safety risks in social VR, including harassment, inappropriate content, privacy threats, identity-related harms, and adult–minor boundary concerns. This position paper aims to initiate broader conversations about developing an affordance-based CSCW research agenda for teen-centered social VR safety, focusing on embodied presence, real-time co-presence, avatar-mediated identity play, spatialized interaction, and the capture of biometric and behavioral data. We translate these affordances into design tensions around protection and autonomy, safety and surveillance, identity play and exploitation prevention, immersion and recoverability, and participatory design and ethical exposure to risk. This work represents our first endeavor to lay a concrete foundation for future CSCW research directions toward safer and more empowering teen social VR experiences.

CCS Concepts

• **Human-centered computing** → **Collaborative and social computing**; **Virtual reality**.

Keywords

Social virtual reality, Teen Online Safety, Affordances, Adolescent Development

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1 Introduction

Social Virtual Reality (VR) is an emerging form of online social space where multiple users interact (mostly) through head-mounted devices, such as VR headsets, in immersive, embodied, and spatialized environments [31]. Through fully or partially body-tracked avatars, spatial proximity, voice, gestures, social VR supports identity exploration, peer connection, collaborative play, and creative expression [28–30]. Popular platforms such as VRChat have become online spaces where teens play immersive games, build virtual intimacies, and sustain emotional connections with others [29, 30]. Industry reports further suggest that a substantial proportion of teens have access to VR headsets, with one 2024 survey estimating that approximately 33% of U.S. teens have access to VR devices [17], and that many teens express positive attitudes toward XR technologies [48]. Together, these trends point to social VR as an increasingly important site of teen social life.

At the same time, teens encounter harassment, sexual comments, identity-based discrimination, privacy concerns, and adult-minor boundary risks in social VR [14, 28–30]. While not entirely new, these harms are reshaped in how they are experienced, recognized, documented, and governed: harassment becomes embodied avatar intrusion, harm escalates in real time, and biometric data capture creates new safety-surveillance tensions [9, 14]. Existing youth online safety frameworks provide an important foundation [35, 44, 45], but they do not account for how immersive, spatial, and data-intensive environments reshape harm and intervention, making teens' safety in social VR an emerging CSCW problem that requires approaches grounded in the affordances of social VR.

To address this gap, we took a **conceptual synthesis** approach to synthesize recurring affordances from prior work on teen online safety, social VR, and adolescent development and interpreted them through developmental and sociotechnical concerns especially salient for teens (e.g., autonomy development, peer influence, identity exploration). We chose this approach over a systematic literature review because, while adolescent online safety and social VR each have been studied extensively as separate areas, few studies examine teens' safety experiences in social VR. Therefore, a conceptual synthesis would serve as an important first step that allows us to connect insights from this emerging literature into a coherent analytical lens. This position paper makes two contributions. First, we synthesize five social VR affordances that reshape how teens experience and manage risk. Second, we identify five design tensions and corresponding new research questions that show why teen social VR safety needs its own research agenda, rather than merely extending existing online safety approaches. As such, our goal is to lay the groundwork for future CSCW research on teen-centered safety in social VR.

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2 Background: Mapping Social VR Affordances to Teen Safety Concerns

In this section, we synthesize prior work through five affordances that distinguish social VR from other digital spaces. We particularly focus on these affordances since they are central to social VR interaction, relevant to adolescent development and safety, and useful for examining design tensions in teen-centered systems. We acknowledge that although they do not represent an exhaustive taxonomy or framework, they could provide an initial analytical lens for understanding how social VR reshapes youth online safety and motivating future empirical CSCW research.

2.1. Embodied Presence. Social VR allows teens to interact through embodied avatars that move, gesture, and occupy shared virtual space. This embodied presence makes social VR meaningful for teens to convey emotions, form social connections, and communicate in ways that may be difficult through text-based interaction [19, 30]. For some teens, especially those who feel isolated or marginalized offline, embodied interaction in social VR can foster a sense of belonging, comfort, and emotional connection [1, 30].

At the same time, prior studies have documented teens' experiences with slurs, sexual comments, discriminatory jokes, physical aggression toward avatars, and other forms of harassment in social VR [14, 30]. Due to immersive presence and avatar embodiment, these incidents may feel more physically and emotionally proximate than similar interactions in text- or screen-based environments [7, 14]. Thus, social VR safety tools must address not only harmful content, but also embodied and felt experiences of intrusion, intimidation, and vulnerability, which could be heightened during adolescence.

2.2. Real-Time Co-Presence. Social VR interactions are often synchronous and socially dynamic, supporting collaboration, peer bonding, and social-emotional learning through voice, movement, and shared activities [13, 26, 49]. For teens, whose peer relationships are especially intense and socially consequential [11, 42], this real-time social context can be both a strength and a vulnerability.

Real-time co-presence changes the temporality of risk. Harmful interactions can escalate quickly through voice, movement, proximity, and group behavior. Adolescents are still developing the capacity for in-the-moment risk recognition and self-advocacy [22], making it especially challenging for them to recognize and respond to temporal harms. Prior work has shown that the psychological and emotional impact of harassment in social VR may be amplified by the immersive and real-time nature of these environments [7, 14]. This calls for safety mechanisms that provide immediate support and escalation-sensitive moderation without undermining teens' autonomy or social participation.

2.3. Avatar-Mediated Identity Play. Avatar-based anonymity and pseudonymity are central to how teens explore identity in social VR, enabling experimentation with self-presentation, relationships, gender expression, personal style, and alternative versions of the self [23, 25, 33], developmentally significant during adolescence [16]. This could be valuable for teens overall, who report feeling more comfortable initiating conversations and forming relationships behind an avatar [19]. It could be even more beneficial for marginalized teens as, as pseudonymous avatar identities can support their exploration of identities that are less accepted offline [1, 32].

However, since avatars can obscure a user's offline identity, adults may disguise themselves as minors or use underage-looking avatars in sexualized contexts, enabling deception and grooming [14, 27, 38, 40]. Anonymity and pseudonymity thus can function as a dual mechanism that facilitates both developmentally meaningful identity play and exploitative identity practices targeting minors in social VR. Therefore, social VR safety tools need to support teens' identity play and self-expression while reducing opportunities for exploitative or manipulative identity practices.

2.4. Spatialized Interaction. Social VR makes "space" a medium of social interaction, where users stand, how close they are, whether they follow or surround others, and how they use gaze, gesture, and movement can all shape the meaning of an interaction. For teens, spatialized interaction can foster playful, creative, and collaborative experiences by enabling them to build virtual worlds, participate in multiplayer activities, and create shared environments that support peer connection and social learning [26, 30].

However, spatialized interaction also creates distinctive safety concerns. Following, crowding, looming, and group intimidation can become forms of harassment or boundary violation [7, 14]. Yet, existing moderation primarily focuses on discrete content rather than embodied behavioral patterns [39]. Even platforms with proximity-based controls [43] are still ill-equipped to address dynamic spatial harassment patterns [7], a particular concern for teens whose heightened sensitivity to peer dynamics makes such behaviors especially concerning. As a result, safety tools need to account for spatial behaviors and social context, not only individual content violations.

2.5. Biometric and Behavioral Data Capture. Social VR also depends on extensive behavioral and sensor-based data. VR devices and platforms may collect or infer sensitive information from body posture, eye gaze, pupil dilation, gestures, facial expressions, voice, spatial behavior, and other embodied signals [10, 15, 24]. These data streams can make social VR interaction immersive, responsive, and may support more context-aware safety tools.

At the same time, such data practices can introduce serious privacy and surveillance concerns. The current regulatory landscape (e.g., COPPA) does not restrict the collection and storage of teens' behavioral data for VR [15]. In addition, teens may not fully understand what data are collected, how those data are used, who can access them, or how they may be repurposed [9, 15]. Prior work further suggests that young users may be unaware of how to manage data-sharing settings, limit personal disclosure, or establish boundaries with strangers [9, 28]. These risks are compounded by limited parental oversight capacity, where parents generally lack security and privacy awareness and rely on informal strategies such as verbal guidance rather than technical safeguards like parental controls [9]. Teen social VR safety, therefore, requires privacy-preserving approaches that minimize data collection while still supporting effective intervention. Figure 1 in the Appendix summarizes five affordances and their corresponding online risks for teens.

3 Design Tensions and Potential New CSCW Research Directions for Teen Social VR Safety

Based on the five affordances discussed above, we identify five design tensions and corresponding new research questions to guide future research. We derived these tensions by asking, for each affordance: (1) what developmental or social opportunity it creates for teens; (2) what safety risk it might amplify, transform, or make harder to govern; and (3) what design tension emerges when platforms attempt to support teen agency while preventing harm. As a result, by highlighting these tensions, we aim to collectively suggest potential directions for future empirical CSCW research rather than offering systematic evidence that each risk is unique to social VR.

3.1. Protection vs. Autonomy: Designing Safety Tools That Support Teens' Unique and Developmentally Appropriate Agency. Adolescence is a critical period for autonomy development, identity exploration, and social risk-taking; hence, overly restrictive safety tools not only frustrate teens, but also can actively interfere with developmentally important tasks [20, 47]. At the same time, teens, especially younger teens, have not yet reached full cognitive and psychosocial maturity, such as social risk recognition and self-advocacy, compared with adult users [22], making them more vulnerable when protection is absent. This tension is intensified by social VR's embodied, synchronous, and spatial interaction: teens may need immediate protection from unwanted proximity, embodied harassment, or coercive peer dynamics, but they also need agency to decide when to leave, block, report, or seek peer support.

In this sense, we invite CSCW research on teen social VR safety to explore: *How can social VR safety tools protect teens from embodied and relational harm while preserving their unique and developmentally appropriate agency to explore identity, relationships, and community?*

For example, future CSCW research may consider designing and evaluating boundary-setting tools tailored to immersive environments, including personal space controls, proximity-based interventions, temporary safe zones, trusted-peer escalation, and post-incident reflection tools. Many social VR platforms already offer relevant mechanisms such as personal space controls and blocking features (e.g., [39, 41, 43]), but whether they are designed with teen users in mind remains an open question. Future work can examine how existing safety tools scaffold teens' self-directed risk management, help-seeking, and recovery across developmental stages: early adolescents may benefit from clearer guidance and lower-friction protective defaults, while older teens may prefer tools that support independent boundary-setting and selective help-seeking [20, 46]. Researchers can also examine how teens' peer dynamics, more intense and influential than those of most adult users [11, 42], shape whether and how teens adopt and use safety tools.

3.2. Safety vs. Surveillance: Developing Privacy-Preserving Multimodal Moderation for Teens. AI-based moderation and real-time risk detection (e.g., [5, 34, 37]) may help identify harassment, sexual content, grooming, or distress in social VR, but at the cost of data collection and the potential risk of surveillance [9]. For teens, this tension could be distinct on legal and developmental dimensions. Adolescents between 13 and 18 are in the regulatory grey zone as they are outside of the protection of the US Children's Online Privacy Protection Rule (COPPA) framework [18], which lacks the legal standing for them to meaningfully consent to the biometric data collection for moderation purposes [24]. Developmentally, teens are still navigating privacy boundaries and understanding the abstract institutional governance of what data are being collected, how those data are used, and how to exercise available privacy controls [21, 47]. These concerns may be further complicated by behavioral, biometric, and emotional data, which may create risks related to consent, profiling, algorithmic bias, retention, and secondary use [24]. Biased moderation systems may also disproportionately affect marginalized teens if culturally specific behaviors, identity expression, disability-related behaviors, voices, or accents are misclassified as unsafe.

Therefore, we invite CSCW research on teen social VR safety to explore: *What forms of data collection are necessary, proportionate, and acceptable for supporting teen safety in social VR, and how can platforms minimize surveillance while still enabling timely intervention?*

We suggest that CSCW research critically examine whether multimodal safety tools, which are currently designed largely for adult users or the general population, are appropriate for teen contexts. Future work can examine how teens themselves understand and experience data collection in social VR, how meaningful assent (beyond parental consent) can be designed into these systems for teen users, and whether sensitive signals can be processed locally or ephemerally to minimize retention. Researchers could also evaluate whether AI-based tools perform equitably across teens with different genders, racial and ethnic backgrounds, disability statuses, voices, accents, and identity expressions.

3.3. Identity Play vs. Exploitation Prevention: Supporting Teens' Critical Developmental Needs for Identity Formation Through More Nuanced Avatar-Mediated Identity Exploration Without Enabling Harm. Developmentally, teens are actively constructing who they are personally and socially [8, 16], and social VR can provide a safe place for teens to try identity development, practice self-presentation, and receive social feedback [23, 25, 33]. At the same time, the same affordance can create heightened exploitation risks where avatar-based anonymity can enable age deception, grooming, and sexualized uses of underage-looking avatars [14, 27, 38]. Rigid identity verification or avatar restrictions may reduce some risks, but they may also risk foreclosing a developmentally significant space for self-discovery. For marginalized teens, anonymity and flexible self-presentation can be important protections, especially in hostile or unsupportive offline environments [1, 32]. In this sense, safety measures designed to restrict identity flexibility could make the space less safe for some teens.

Therefore, we propose a new research question for future CSCW research on teen social VR safety: *How can future VR platforms support teens' critical developmental needs for identity formation through more nuanced avatar-mediated identity exploration while preventing exploitative and deceptive identity practices targeting minors?*

We suggest that CSCW research investigate safeguards that preserve teens' expressive flexibility while reducing identity-based

harm. Possible directions include teen-centered age assurance approaches that do not require full identity disclosure, community norm settings, avatar labeling, and moderation practices that distinguish developmentally appropriate identity exploration from exploitative deception. Such designs need to particularly recognize that for many marginalized teens, privacy and flexible self-presentation may be central to safety itself.

3.4. Immersion vs. Recoverability: Making Harm Targeting Teens Reportable Without Constant Recording. Social VR interactions are immersive, embodied, and often ephemeral, which can complicate how teens recognize, document, report, and recover from harmful experiences. Unlike text-based platforms where harmful messages or posts may remain visible, social VR harms may occur through voice, movement, or group behavior that disappears once the interaction ends. Teens may therefore struggle to provide evidence, reconstruct what happened, or receive validation after an incident. For example, when a harmful incident leaves no trace, teens could face self-doubt about whether what happened was real or serious. Although parental mediation is suggested in existing social VR safety design [43], prior work has found that teens sometimes did not seek help because they anticipated that trusted adults would dismiss their concerns [14]. In highly peer-visible social VR settings, reporting an incident may carry the social cost of being seen as oversensitive for escalating a situation that peers treat as normal. Yet, constant recording would introduce serious privacy risks to bystanders and participants.

Therefore, we invite the CSCW community to explore: *How can future VR platforms support teens to capture, report, and recover from embodied harm in ways that account for their distinct barriers without requiring constant recording or invasive surveillance?*

We suggest that future CSCW research examine how teens experience, interpret, and respond to embodied and spatial harm in social VR differently from adult users, including how teens distinguish playful closeness from boundary violation, how group dynamics escalate harassment, and how embodied incidents affect future participation. Future systems should incorporate privacy-preserving mechanisms for recoverability, such as teen-controlled incident capture, contextual reporting prompts, post-incident reconstruction tools, and trauma-informed feedback after reporting.

3.5. Participatory Design vs. Ethical Exposure to Risk: Involving Teens in Technology Design Without Reproducing Harm. Participatory design with teens (e.g., [2–4, 36]) is a promising approach for teen-centered social VR safety design. However, participatory research on social VR safety raises ethical challenges. Studying embodied intrusion or inappropriate content with teens may expose teens to distressing material. Even fictionalized scenarios can blur the boundary between simulation and genuine exposure in immersive, real-time environments.

Therefore, we propose a new research question for future CSCW research on teen social VR safety: *How can researchers meaningfully involve teens in social VR safety design without exposing them to unnecessary risk, distress, or privacy loss?*

We suggest that CSCW researchers adapt participatory design methods for immersive safety research. Future work can develop and evaluate lower-risk design probes and reflective activities within carefully bounded simulations that account for both the immersive nature of social VR and teens' developmental needs. Ethical research protocols should provide teens with meaningful control over participation, data capture, withdrawal, and disclosure, while also offering support resources, warnings, privacy protections, and clear explanations of mandated reporting obligations [6]. Researchers should clearly define target age groups and move away from treating teens as a homogeneous population, since early, middle, and older adolescents may differ in their cognitive, social, emotional, and privacy needs [12]. Inclusive research practices should also attend to gender, disability, race, ethnicity, sexuality, and other dimensions of identity, since social VR safety tools may affect teens differently across social positions. Table 1 in the Appendix summarizes the five design tensions above, open research questions, and potential future directions for CSCW research.

4 Conclusion

Social VR transforms the digital landscape for teens through unique affordances that create both opportunities and design tensions that cannot be resolved through platform-level tools alone. By foregrounding these tensions, this position paper lays a foundation for future CSCW research on social VR environments that are safer for teens while supporting their agency, privacy, identity exploration, and social connection. Realizing this agenda will require collective effort from teens, peers, caregivers, educators, moderators, and policymakers, since no single tool, platform, or actor can adequately address the risks of immersive social VR.

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References

[1] Dane Acena and Guo Freeman. 2021. "In My Safe Space": Social Support for LGBTQ Users in Social Virtual Reality. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) *(CHI EA '21)*. Association for Computing Machinery, New York, NY, USA, Article 301, 6 pages. https://doi.org/10.1145/3411763.3451673

[2] Zainab Agha, Karla Badillo-Urquiola, and Pamela J. Wisniewski. 2023. "Strike at the Root": Co-designing Real-Time Social Media Interventions for Adolescent Online Risk Prevention. *Proc. ACM Hum.-Comput. Interact.* 7, CSCW1, Article 149 (April 2023), 32 pages. https://doi.org/10.1145/3579625

[3] Zainab Agha, Zinan Zhang, Oluwatomisin Obajemu, Luke Shirley, and Pamela J. Wisniewski. 2022. A Case Study on User Experience Bootcamps with Teens to Co-Design Real-Time Online Safety Interventions. In *Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems* (New Orleans, LA, USA) *(CHI EA '22)*. Association for Computing Machinery, New York, NY, USA, Article 40, 8 pages. https://doi.org/10.1145/3491101.3503563

[4] Naima Samreen Ali, Zainab Agha, Neeraj Chatlani, Jinkyung Park, and Pamela J. Wisniewski. 2024. A Case Study on Facilitating a Long-Term Youth Advisory Board to Involve Youth in Adolescent Online Safety Research. In *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) *(CHI EA '24)*. Association for Computing Machinery, New York, NY, USA, Article 499, 8 pages. https://doi.org/10.1145/3613905.3637121

[5] Shiza Ali, Afsaneh Razi, Seunghyun Kim, Ashwaq Alsoubai, Chen Ling, Munmun De Choudhury, Pamela J. Wisniewski, and Gianluca Stringhini. 2023. Getting Meta: A Multimodal Approach for Detecting Unsafe Conversations within Instagram Direct Messages of Youth. *Proc. ACM Hum.-Comput. Interact.* 7, CSCW1, Article 132 (April 2023), 30 pages. https://doi.org/10.1145/3579608

[6] Karla Badillo-Urquiola, Zachary Shea, Zainab Agha, Irina Lediaeva, and Pamela Wisniewski. 2021. Conducting Risky Research with Teens: Co-designing for the Ethical Treatment and Protection of Adolescents. *Proc. ACM Hum.-Comput. Interact.* 4, CSCW3, Article 231 (Jan. 2021), 46 pages. https://doi.org/10.1145/3432930

[7] Lindsay Blackwell, Nicole Ellison, Natasha Elliott-Deflo, and Raz Schwartz. 2019. Harassment in Social Virtual Reality: Challenges for Platform Governance. *Proc. ACM Hum.-Comput. Interact.* 3, CSCW, Article 100 (Nov. 2019), 25 pages. https://doi.org/10.1145/3359202

[8] Susan Branje, Elisabeth L De Moor, Jenna Spitzer, and Andrik I Becht. 2021. Dynamics of identity development in adolescence: A decade in review. *Journal of Research on Adolescence* 31, 4 (2021), 908–927.

[9] Jiaxun Cao, Abhinaya S. B, Anupam Das, and Pardis Emami-Naeini. 2024. Understanding Parents' Perceptions and Practices Toward Children's Security and Privacy in Virtual Reality. In *2024 IEEE Symposium on Security and Privacy (SP)*. 1554–1572. https://doi.org/10.1109/SP54263.2024.00222

[10] Polona Caserman, Augusto Garcia-Agundez, Robert Konrad, Stefan Göbel, and Ralf Steinmetz. 2019. Real-time body tracking in virtual reality using a Vive tracker. *Virtual Reality* 23, 2 (June 2019), 155–168. https://doi.org/10.1007/s10055-018-0374-z

[11] Gabriele Chierchia, Blanca Piera Pi-Sunyer, and Sarah-Jayne Blakemore. 2020. Prosocial influence and opportunistic conformity in adolescents and young adults. *Psychological Science* 31, 12 (2020), 1585–1601.

[12] Cleveland Clinic. 2025. Child Development: Milestones & Stages. *Cleveland Clinic Health Library* (2025). https://my.clevelandclinic.org/health/articles/21559-child-development Accessed 2026-01-21.

[13] Barney Dalgarno and Mark J. W. Lee. 2010. What are the learning affordances of 3-D virtual environments? *British Journal of Educational Technology* 41, 1 (2010), 10–32. https://doi.org/10.1111/j.1467-8535.2009.01038.x arXiv:https://bera-journals.onlinelibrary.wiley.com/doi/pdf/10.1111/j.1467-8535.2009.01038.x

[14] Elmira Deldari, Diana Freed, Julio Poveda, and Yaxing Yao. 2023. An Investigation of Teenager Experiences in Social Virtual Reality from Teenagers', Parents', and Bystanders' Perspectives. In *Nineteenth Symposium on Usable Privacy and Security (SOUPS 2023)*. USENIX Association, Anaheim, CA, 1–17. https://www.usenix.org/conference/soups2023/presentation/deldari

[15] Ellysse Dick. 2021. *Balancing user privacy and innovation in augmented and virtual reality.* Technical Report. Information Technology and Innovation Foundation.

[16] Erik H Erikson. 1968. *Identity: Youth and crisis*. Vol. 68. Norton.

[17] Filipe Espósito. 2024. Survey shows that teenagers are using more VR devices in the US. 9to5Mac. https://9to5mac.com/2024/04/09/survey-teenagers-using-more-vr-devices/

[18] Federal Trade Commission. [n. d.]. Children's Online Privacy Protection Rule ("COPPA"). https://www.ftc.gov/legal-library/browse/rules/childrens-online-privacy-protection-rule-coppa 16 CFR Part 312. Accessed May 9, 2026.

[19] Diana Freed. 2023. *Youth Digital Safety Experiences in Different Sociotechnical Environments and Spaces*. Cornell University.

[20] Joy Gabrielli and Susanne E. Tanski. 2020. The A, B, Cs of Youth Technology Access: Promoting Effective Media Parenting. *Clinical Pediatrics* 59, 4-5 (2020), 496–499. https://doi.org/10.1177/0009922819901008 arXiv:https://doi.org/10.1177/0009922819901008 PMID: 31948288.

[21] Susan A Gelman, Shaylene E Nancekivell, Young-eun Lee, and Florian Schaub. 2024. Children's Understanding of Digital Tracking and Digital Privacy. *Handbook of Children and Screens: Digital Media, Development, and Well-Being from Birth Through Adolescence* (2024), 643–649.

[22] Grace Icenogle, Laurence Steinberg, Natasha Duell, Jason Chein, Lei Chang, Nandita Chaudhary, Laura Di Giunta, Kenneth A Dodge, Kostas A Fanti, Jennifer E Lansford, et al. 2019. Adolescents' cognitive capacity reaches adult levels prior to their psychosocial maturity: Evidence for a "maturity gap" in a multinational, cross-sectional sample. *Law and human behavior* 43, 1 (2019), 69.

[23] Yasmin B. Kafai, Deborah A. Fields, and Melissa S. Cook. 2010. Your Second Selves: Player-Designed Avatars. *Games and Culture* 5, 1 (2010), 23–42. https://doi.org/10.1177/1555412009351260 arXiv:https://doi.org/10.1177/1555412009351260

[24] Girard Kelly, Jeff Graham, Jill Bronfman, and Steve Garton. 2022. Privacy of Virtual Reality: Our Future in the Metaverse and Beyond. https://ssrn.com/abstract=4698607 Available at SSRN.

[25] Chaeeun Ko and Seongcheol Kim. 2024. Adolescent Female Users' Avatar Creation in Social Virtual Worlds: Opportunities and Challenges. *Behavioral Sciences* 14, 7 (2024). https://doi.org/10.3390/bs14070539

[26] Tommaso Loiacono, Marco Trabucchi, Nicolò Messina, Vito Matarazzo, Franca Garzotto, and Eleonora Aida Beccaluva. 2018. Social MatchUP -: a Memory-like Virtual Reality Game for the Enhancement of Social Skills in Children with Neurodevelopmental Disorders. In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems* (Montreal QC, Canada) *(CHI EA '18)*. Association for Computing Machinery, New York, NY, USA, 1–6. https://doi.org/10.1145/3170427.3188525

[27] Nuria Lorenzo-Dus and Cristina Izura. 2017. "cause ur special": Understanding trust and complimenting behaviour in online grooming discourse. *Journal of Pragmatics* 112 (2017), 68–82. https://doi.org/10.1016/j.pragma.2017.01.004

[28] Divine Maloney, Guo Freeman, and Andrew Robb. 2020. It Is Complicated: Interacting with Children in Social Virtual Reality. In *2020 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*. 343–347. https://doi.org/10.1109/VRW50115.2020.00075

[29] Divine Maloney, Guo Freeman, and Andrew Robb. 2020. A Virtual Space for All: Exploring Children's Experience in Social Virtual Reality. In *Proceedings of the Annual Symposium on Computer-Human Interaction in Play* (Virtual Event, Canada) *(CHI PLAY '20)*. Association for Computing Machinery, New York, NY, USA, 472–483. https://doi.org/10.1145/3410404.3414268

[30] Divine Maloney, Guo Freeman, and Andrew Robb. 2021. Stay Connected in An Immersive World: Why Teenagers Engage in Social Virtual Reality. In *Proceedings of the 20th Annual ACM Interaction Design and Children Conference* (Athens, Greece) *(IDC '21)*. Association for Computing Machinery, New York, NY, USA, 69–79. https://doi.org/10.1145/3459990.3460703

[31] Joshua McVeigh-Schultz, Elena Márquez Segura, Nick Merrill, and Katherine Isbister. 2018. What's It Mean to "Be Social" in VR? Mapping the Social VR Design Ecology. In *Proceedings of the 2018 ACM Conference Companion Publication on Designing Interactive Systems* (Hong Kong, China) *(DIS '18 Companion)*. Association for Computing Machinery, New York, NY, USA, 289–294. https://doi.org/10.1145/3197391.3205451

[32] Raquel Miño-Puigcercós, Pablo Rivera-Vargas, and Cristóbal Cobo Romaní. 2019. *Virtual Communities as Safe Spaces Created by Young Feminists: Identity, Mobility and Sense of Belonging*. Springer International Publishing, Cham, 123–140. https://doi.org/10.1007/978-3-319-96113-2_8

[33] Matti Mäntymäki and Kai Riemer. 2014. Digital natives in social virtual worlds: A multi-method study of gratifications and social influences in Habbo Hotel. *International Journal of Information Management* 34, 2 (2014), 210–220. https://doi.org/10.1016/j.ijinfomgt.2013.12.010

[34] Jinkyung Park, Joshua Gracie, Ashwaq Alsoubai, Gianluca Stringhini, Vivek Singh, and Pamela Wisniewski. 2023. Towards Automated Detection of Risky Images Shared by Youth on Social Media. In *Companion Proceedings of the ACM Web Conference 2023* (Austin, TX, USA) *(WWW '23 Companion)*. Association for Computing Machinery, New York, NY, USA, 1348–1357. https://doi.org/10.1145/3543873.3587607

[35] Jinkyung Katie Park, Mamtaj Akter, Pamela Wisniewski, and Karla Badillo-Urquiola. 2024. It's Still Complicated: From Privacy-Invasive Parental Control to Teen-Centric Solutions for Digital Resilience. *IEEE Security & Privacy* 22, 5 (2024), 52–62. https://doi.org/10.1109/MSEC.2024.3417804

[36] Jinkyung Katie Park, Renkai Ma, Naima Samreen Ali, Naulsberry Jean Baptiste, Zainab Agha, and Pamela J. Wisniewski. 2025. Teens, Privacy, and Algorithms: Navigating and Co-Designing Solutions for Interpersonal Boundary Management on Social Media. In *Proceedings of the 24th Interaction Design and Children (IDC '25)*. Association for Computing Machinery, New York, NY, USA, 589–607. https://doi.org/10.1145/3713043.3728840

[37] Afsaneh Razi, Ashwaq Alsoubai, Seunghyun Kim, Shiza Ali, Gianluca Stringhini, Munmun De Choudhury, and Pamela J. Wisniewski. 2023. Sliding into My DMs: Detecting Uncomfortable or Unsafe Sexual Risk Experiences within Instagram Direct Messages Grounded in the Perspective of Youth. *Proc. ACM Hum.-Comput. Interact.* 7, CSCW1, Article 89 (April 2023), 29 pages. https://doi.org/10.1145/3579522

[38] Carla Reeves. 2013. Fantasy depictions of child sexual abuse: The problem of ageplay in Second Life. *Journal of Sexual Aggression* 19, 2 (2013), 236–246. https://doi.org/10.1080/13552600.2011.640947 arXiv:https://doi.org/10.1080/13552600.2011.640947

[39] Rec Room. 2025. Safety in Rec Room. https://recroom.com/safety Accessed: 2026-05-10.

[40] Kelsea Schulenberg, Guo Freeman, Lingyuan Li, and Bart Piet Knijnenburg. 2024. Does who you are or appear to be matter?: Understanding identity-based harassment in social vr through the lens of (mis) perceived identity revelation. *Proceedings of the ACM on Human-Computer Interaction* 8, CSCW2 (2024), 1–40.

[41] Vivek Sharma. 2022. Introducing a Personal Boundary for Horizon Worlds and Venues. https://about.fb.com/news/2022/02/personal-boundary-horizon/ Accessed: 2026-05-10.

[42] Laurence Steinberg. 2017. A social neuroscience perspective on adolescent risk-taking. In *Biosocial theories of crime*. Routledge, 435–463.

[43] VRChat. 2025. Safety Resources: For Players. https://help.vrchat.com/hc/en-us/articles/33302819755539-Safety-Resources-For-Players Accessed: 2026-05-10.

[44] Pamela Wisniewski, Arup Kumar Ghosh, Heng Xu, Mary Beth Rosson, and John M Carroll. 2017. Parental control vs. teen self-regulation: Is there a middle ground for mobile online safety?. In *Proceedings of the 2017 ACM conference on computer supported cooperative work and social computing*. 51–69.

[45] Pamela Wisniewski, Haiyan Jia, Heng Xu, Mary Beth Rosson, and John M Carroll. 2015. " Preventative" vs." Reactive" How Parental Mediation Influences Teens' Social Media Privacy Behaviors. In *Proceedings of the 18th ACM conference on computer supported cooperative work & social computing*. 302–316.

[46] Pamela Wisniewski, Jinkyung Park, Karla Badillo-Urquiola, Joy Gabrielli, Jennifer L Doty, and Heidi Hartikainen. 2024. Moving beyond fear and restriction to promoting adolescent resilience and intentional technology use. In *Handbook of Children and Screens: Digital Media, Development, and Well-Being from Birth Through Adolescence*. Springer Nature Switzerland Cham, 403–410.

[47] Pamela J Wisniewski, Jessica Vitak, and Heidi Hartikainen. 2022. Privacy in adolescence. In *Modern socio-technical perspectives on privacy*. Springer International

Publishing Cham, 315–336.
[48] XR Association. 2025. New XRA Survey Finds One in Five Teens Own a Virtual Reality Headset. XR Association. https://xra.org/new-xra-survey-finds-one-in-five-teens-own-a-virtual-reality-headset/
[49] Feng Zhang, Yan Zhang, Gege Li, and Heng Luo. 2023. Using Virtual Reality Interventions to Promote Social and Emotional Learning for Children and Adolescents: A Systematic Review and Meta-Analysis. *Children* 11, 1 (2023). https://doi.org/10.3390/children11010041

5 Appendix

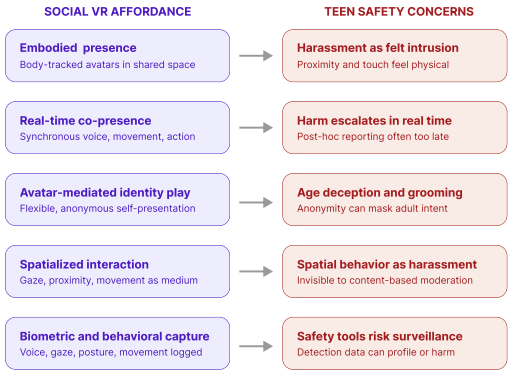

Figure 1: Five social VR affordances and how each map onto online risks for teens

Table 1: Five design tensions in teen social VR safety, each paired with an open research question and key directions for future CSCW work. These tensions were derived by asking, for each affordance: (1) what developmental or social opportunity it creates for teens; (2) what safety risk it might amplify, transform, or make harder to govern; and (3) what design tension emerges when platforms attempt to support teen agency while preventing harm.

Design tension	Open research question	Key CSCW research directions
Protection vs. autonomy	*How can social VR safety tools protect teens from embodied and relational harm while preserving their developmentally appropriate agency to explore identity, relationships, and community?*	• Personal space and proximity controls tailored to teens • Age-graded defaults across early, middle, and older adolescence • Trusted-peer escalation and post-incident reflection
Safety vs. surveillance	*What forms of data collection are necessary, proportionate, and acceptable for supporting teen safety in social VR, and how can platforms minimize surveillance while still enabling timely intervention?*	• Meaningful teen assent beyond parental consent • Local or ephemeral processing of sensitive signals • Audits for bias across gender, race, disability, voice, accent
Identity play vs. exploitation prevention	*How can future VR platforms support teens' developmental needs for identity formation through nuanced avatar-mediated exploration while preventing exploitative and deceptive identity practices targeting minors?*	• Teen-centered age assurance without full identity disclosure • Community norm settings and avatar labeling • Safeguards that protect marginalized teens' anonymity
Immersion vs. recoverability	*How can future VR platforms support teens to capture, report, and recover from embodied harm in ways that account for their distinct barriers without requiring constant recording or invasive surveillance?*	• Teen-controlled incident capture and contextual reporting prompts • Post-incident reconstruction tools • Trauma-informed feedback after reporting
Participatory design vs. ethical exposure	*How can researchers meaningfully involve teens in social VR safety design without exposing them to unnecessary risk, distress, or privacy loss?*	• Lower-risk design probes and bounded simulations • Teen-controlled data capture, withdrawal, and disclosure • Inclusive recruitment across developmental stages and identities