Safe and Secure VR: Policy Issues Impacting Kids' Use of Immersive Tech

common sense®

Safe and Secure VR:
Policy Issues Impacting Kids' Use of Immersive Tech

By Joseph Jerome

Special thanks to Lindsey Barrett, Mary Berk, Jon Brescia, Jeff Haynes, Girard Kelly, Joe Newman, and Jenny Radesky for their thoughtful feedback. Any errors are the author's own.

Executive summary and recommendations

Immersive technologies like virtual reality have long promised to offer families a wealth of new digital experiences and social interactions. However, for years the limitations of VR headsets included being expensive, bulky, and uncomfortable. Sony's first attempt at PlayStation VR required a tangled mess of wires to operate, while Nintendo's family-focused Labo VR Kit was made of cardboard. In 2020, led by Facebook's Oculus Quest 2 headset, VR is now available to families eager for virtual escapes at a more affordable price and without a complicated setup.[1] Major VR-exclusive releases like a new installment of Valve's Half-Life series made headlines, and Sony has announced a next-generation VR headset for PlayStation 5. Standalone VR headsets promise to be a forerunner for even more immersive tech, but VR currently encompasses all the issues present with game consoles, app stores, and social media in one device.

Enthusiasm among kids and teens about VR will likely drive the market for VR hardware and content in the near future.[2] While VR use is still not widespread, improving VR now is important so that we have the right protections in place when every community has easy access to VR. The mainstream adoption of VR raises a number of difficult policy issues, particularly how VR platforms should approach usage by children and young people. Research from Common Sense with the founding director of Stanford University's Virtual Human Interaction Lab found that the long-term effects of VR use on children's developing brains and health are unknown.[3] Improving VR shouldn't come at the cost of experimenting on kids. Efforts are already underway to establish best practices for developers to make safe and comfortable immersive experiences, but more work is needed to create technical rules, codes of conduct, and user expectations to regulate VR for younger users and give parents peace of mind.

What is virtual reality?

Virtual reality (VR) aims to create a fully immersive user experience by replacing physical reality with a digital environment. VR requires specialty hardware and most commonly involves headsets that rely on stereoscopic displays, spatial audio, and motion-tracking sensors to simulate a "real-life" experience. VR can create or enhance characteristics such as presence, embodiment, and agency.[4]

Augmented reality (AR) is a close cousin to VR. While VR focuses on immersion into a digital experience, AR layers virtual elements onto real-world environments. The Pokémon Go game popularized AR with the public, but everything from Snapchat filters to a holographic heads-up display can be a form of AR. More advanced AR technologies offer "mixed reality" experiences, combining the real with augmented virtual information. Smart glasses and other interactive virtual displays are generally considered AR but are a related type of immersive tech. AR and other mixed reality experiences raise important policy concerns, but this issue brief is primarily focused on VR.

[1] Noah Smith, Virtual Reality Is Starting to See Actual Gains in Gaming, Washington Post (Feb. 4, 2021), https://www.washingtonpost.com/video-games/2021/02/04/virtual-reality-future-games/; Andrew Bosworth, No Looking Back, Tech@facebook (Jan. 6, 2021), https://tech.fb.com/no-looking-back/.

[2] Yamada-Rice, Dylan et al., Children and Virtual Reality: Emerging Possibilities and Challenges (2017), http://digilitey.eu/wp-content/uploads/2015/09/CVR-Final-PDF-reduced-size.pdf. A 2017 survey found that 70% of U.S. children between the ages of 8 and 15 were interested in VR.

[3] Jennifer Aubrey et al. Common Sense Media, Virtual Reality 101: What You Need to Know About Kids and VR (2018), https://www.commonsensemedia.org/sites/default/files/uploads/pdfs/csm_vr101_final.pdf [hereinafter Virtual Reality 101].

[4] The XRSI Definitions of Extended Reality (XR), XR Safety Initiative Standard Publication XR-001, https://xrsi.org/wp-content/uploads/2020/03/XRSI-Standard-XR-Definitions-XR-001.pdf (last visited Jan. 25, 2021).

This issue brief details current VR practices and issues and makes recommendations for VR platforms and app developers so they can introduce immersive experiences to kids and families responsibly.

First, immersive tech collects and processes vast quantities of data, presenting a number of tough challenges about privacy that companies must step up to meet. Some of these challenges go beyond what applicable privacy laws contemplate, impacting individual autonomy, potential reputational harm, and the mixture of virtual and offline identity.[5] VR must also comply with existing privacy laws, including the California Consumer Privacy Act (CCPA) and state biometric and facial recognition regulations as well as federal laws like the Children's Online Privacy Protection Act (COPPA).

Common Sense recommends that VR platforms and app developers:

- Improve privacy notices and begin making VR-specific data disclosures, including explaining how any biometrically derived data can be collected or used, both prior to purchase and through just-in-time notices.
- Limit profiling and ban behavioral advertising using sensitive VR data for children and teens, and do not merge any VR profile with data collected outside the headset.
- Avoid making any inferences (including about mood states) that can discriminate against or harm VR users.
- Better articulate what data minimization policies mean in the context of virtual reality. VR platforms and app stores must better enforce their developer terms, which often include data collection and use restrictions, and extend those limits to themselves.
- Mitigate problematic effects from VR experiences that can manipulate VR users and consider specifically how virtual identity can be protected.

Second, online content moderation is a mess. The quality and caliber of how social networks and other online platforms and services moderate user behavior and their resulting posts, video, and audio vary wildly. Failures to address these issues online are already a problem, but they may be an even bigger challenge for immersive tech and social VR. Addressing harassment and ensuring inclusivity is essential in VR.

Common Sense recommends that VR platforms and app developers:

- Develop easier methods and functionality to stream or cast VR content to a mobile device, laptop, or television, so parents can monitor and share in their children's VR experiences.
- Communicate and reiterate behavior expectations at regular intervals, using plain language and positive reinforcement. Ensure that any kid- and teen-friendly VR environments are appropriately staffed with human moderators.
- Provide transparency about how content and behavior is moderated to users and the wider public, including providing access to information to let individuals understand their reputation in VR and when their behavior is being monitored.
- Work with child safety experts to establish policies and design guides that can be shared with the public, including expectations for virtual citizenship.

[5] These concerns were raised by a convening of researchers, academics, and industry stakeholders at the 2018 XR Privacy Summit at Stanford University. More information about the 2018 XR Privacy Summit is available at https://extendedmind.io/xr-privacy.

Third, ratings for VR experiences are treated like extensions of existing video game ratings and do not account for all dimensions of concern. Parental controls for VR platforms are in their infancy, and the effects of screen time remain an open question. Effective parental controls must be built for all VR platforms and expanded to account for the unique features of immersive tech. Ratings are critical for filtering and controlling access to VR experiences, and concerns about screen time take on an entirely new dimension within the confines of a VR headset.

Common Sense recommends that VR platforms and app developers:

- Implement ratings-based controls that allow parents or guardians to filter VR experiences and enable parents to restrict access to specific VR games or experiences by default at system setup. Parents should also be able to block certain types of interactions, such as those with adults or complete strangers.
- Expand app ratings to capture immersive experiences unique to VR and undertake research to better standardize settings for comfort and accessibility.
- Provide not just notices to users about VR screen time and reports about individual app usage, but offer tools to set app-specific time limits or periods where apps cannot be used. Young users should also be encouraged to set their own time limits (especially if a parent has not), and platforms can guide them in this effort.
- On the other side, provide age appropriate resources to explain parental controls to the child so that they are aware that their activity is being monitored. VR platforms should proactively provide resources to parents to facilitate conversations about what and when parental monitoring is appropriate and how kids can self-monitor their use of VR.

I. Introduction

This issue brief discusses how VR platforms provide a new opportunity to rethink and improve privacy protections, content moderation practices, and parental controls. Some aspects of VR are not new.[6] In many respects, VR platforms can be viewed as a different type of video game console. A new installment of Valve's Half-Life series was the biggest VR-exclusive release in 2020, and Facebook's marketing for Oculus emphasizes rhythm games like Beat Saber. Yet VR is more immersive than a flat screen, and it can provide a unique social experience.[7] Echo Arena, for instance, has players adopt a digital avatar and use teamwork and collaboration to play zero-gravity sports. Immersive tech has huge implications for how children socialize and learn.[8] If companies are not pressured to do better in virtual reality, we risk a continuation of a messy digital status quo.

Efforts to address child safety in virtual reality are also not new. Industry stakeholders are already researching age appropriate guidance,[9] and the XR Safety Initiative (XRSI) recently launched a child-safety effort that promises future research and policy recommendations.[10]

However, at present, most VR safety recommendations continue to place much of the onus on parents and guardians to educate themselves.[11] Too often, this puts parents in a "take it or leave it" proposition. Advocacy stakeholders, industry groups, and technical standards bodies are working on guidance for various aspects of VR, but this has led to a variety of different recommendations and best practices. Yet the technology continues to evolve: VR headsets increasingly are leveraging external sensors to offer pass-through functionality,[12] and virtual avatars continue to raise issues intertwined with concerns around "deepfakes,"[13] audiovisual manipulation, and personal identity.[14] While virtual reality is a growing and dynamic industry, Facebook's prominent position should also be recognized.

[6] For example, this is not the first time Common Sense has raised VR as a kid-specific privacy concern. See Ariel Fox Johnson, Inside the Kids Privacy Zone: What Parents and Policymakers Need to Know to Keep Kids Safe and Smart Online (2017), *available at* https://www.commonsensemedia.org/sites/default/files/uploads/kids_action/commonsensekidsaction_kidsprivacyzone_final.pdf.

[7] This dynamic illustrates the challenge of building a "killer app" for VR. *See* Sibjeet Mahapatra, VR, Presence, and the Case of the Missing Killer App, TechCrunch (Mar. 17, 2018), https://techcrunch.com/2018/03/17/vr-presence-and-the-case-of-the-missing-killer-app/.

[8] Ellysse Dick, ITIF, With the Right Investments, AR and VR Can Reduce Education Gaps (Feb. 10, 2021), https://itif.org/publications/2021/02/10/right-investments-ar-and-vr-can-reduce-education-gaps.

[9] XR Association, https://xra.org/public-policy/age-appropriate-use/ (last visited Jan. 25, 2021).

[10] Child Safety Initiative, XRSI, https://xrsi.org/programs/child-safety (last visited Jan. 25, 2021).

[11] Caroline Knorr, Common Sense Media, What Parents Need to Know About Virtual Reality (Apr. 3, 2018), https://www.commonsensemedia.org/blog/what-parents-need-to-know-about-virtual-reality.

[12] Passthrough functionality takes advantage of a VR headsets onboard sensors and sophisticated computer vision to let VR users "see" the outside world through a headset. This can be a safety feature, as well a potential outlet for mixed reality applications that add virtual content onto physical spaces. *See* David Heaney, UploadVR, Oculus Quest Getting Passthrough+ API For AR Apps, Starting With Spatial (Sept. 21, 2020), https://uploadvr.com/oculus-quest-passthrough-api/.

[13] A "deepfake" is a video created using artificial intelligence, showing real people doing and saying things they never did.

[14] Samantha Cole & Emanuel Maiberg, 'They Can't Stop Us:' People Are Having Sex With 3D Avatars of Their Exes and Celebrities, Motherboard (Nov. 19, 2019), https://www.vice.com/en_us/article/j5yzpk/they-cant-stop-us-people-are-having-sex-with-3d-avatars-of-their-exes-and-celebrities.

Oculus, Facebook, and the future of virtual reality

Many companies have released immersive tech geared toward everyday consumers and families, but Facebook has become a prominent player in mainstream virtual reality. The social networking giant's Oculus brand is not just a growing source of revenue but is also the largest VR hardware player.[15] This has important implications for the privacy of VR user data as well as how Facebook's competitors can offer VR apps and services. Facebook also has a long and problematic history when it comes to protecting kids on its services,[16] so efforts the company makes to encourage VR use among youngsters should be carefully examined.

Facebook's failures to protect consumer privacy are well documented, and the company's approach to Oculus has also received criticism.[17] Immersive technology has the potential to collect huge quantities of user data, and Facebook's recent decision to require a Facebook account in order to use an Oculus Quest means this VR data can easily be linked with the other information Facebook collects about individuals online. Facebook Reality Labs has announced a set of high-level innovation principles, but Facebook has avoided making any firm commitments about what it won't do with VR data.[18]

Additionally, Facebook often addresses privacy in the context of interpersonal relationships among users and not how Facebook itself behaves, but Oculus presents a good example of what social media scholar danah boyd refers to as "context collapse."[19] How an individual behaves in VR can be very different from how they present themselves to their real-life family and friends on Facebook, but now Facebook lets an Oculus gamer easily (or accidentally) stream a VR experience to a very different audience of Facebook friends.

Oculus is also not designed to be shared -- even with kids. Despite kid-friendly content, and even a tacit acknowledgement of the service's attraction to young users on its product safety page,[20] the Oculus terms of service prohibit use by children under 13, and Facebook further prohibits users from sharing accounts among multiple people. A parent sharing their headset with their kids technically violates Facebook's terms of use, putting parents in an awkward position.[21] And whether Facebook acknowledges it or not, the reality is that kids are using Oculus, and this requires the attention of Facebook, kid-safety experts, and a diverse community of stakeholders.

---

[15] Andrew Hutchinson, Facebook's Oculus VR Arm Outlines Significant Growth, Announces Messenger Integration, Social Media Today (Feb. 2, 2021), https://www.socialmediatoday.com/news/facebooks-oculus-vr-arm-outlines-significant-growth-announces-messenger-i/594387/; David McLaughlin, Facebook Accused of Squeezing Rival Startups in Virtual Reality, Bloomberg (Dec. 3, 2020), https://www.bloomberg.com/news/articles/2020-12-03/facebook-accused-of-squeezing-rival-startups-in-virtual-reality. VR journalist Ian Hamilton has highlighted Facebook's ability to subsidize Oculus hardware sales. Ian Hamilton, Editorial: Oculus Quest 2's $299 Price Is Just The Beginning For Facebook, Upload VR (Sept. 19, 2020), https://uploadvr.com/editorial-quest-vr-ads-subsidy/.

[16] For a description of Common Sense's past concerns with Facebook's practices involving kids, see Brief of Amicus Curiae Common Sense Media in Support of Petitioner-Appellee Attorney General Maura Healey, SJC-12946 (Nov. 13, 2020), *available at* https://www.commonsensemedia.org/kids-action/blog/why-facebooks-app-developer-investigation-needs-investigating.

[17] Avi Bar-Zeev, Facebook's Oculus Quest 2 Has Some Serious Privacy Issues, OneZero (Sept. 18, 2020), https://onezero.medium.com/facebooks-oculus-quest-2-has-some-serious-privacy-issues-c64ffd3aef76.

[18] Responsible Innovation Principles, Facebook Reality Labs, https://about.fb.com/realitylabs/responsible-innovation-principles/.

[19] danah boyd, How "Context Collapse" Was Coined (Dec. 8, 2013), https://www.zephoria.org/thoughts/archives/2013/12/08/coining-context-collapse.html; *see also* danah boyd, Facebook's Privacy Trainwreck (2008), *available at* https://www.danah.org/papers/FacebookPrivacyTrainwreck.pdf.

[20] Oculus Safety Center, Age Guidelines, https://www.oculus.com/safety-center/?locale=en_US (last visited Jan. 25, 2021) (noting that Facebook "know[s] that children under the age of 13 may want to use Oculus devices . . . .").

[21] Ben Lang, Parents Who Gift Quest 2 to Kids Under 13 Years Old are in for an Unfortunate Surprise, Road to VR (Dec. 26, 2020), https://www.roadtovr.com/oculus-quest-2-facebook-account-required-age-13-years-old/.

II. Effective -- and safe -- VR headsets collect and process vast quantities of data, and immersive tech presents a number of tough challenges about privacy that companies must step up to meet.

Addressing privacy in virtual reality means confronting both the current and future capabilities of immersive tech. In a single recommended 20-minute session in VR, a headset can generate approximately two million data points and unique recordings of body language.[22] Immersive tech can track huge quantities of highly sensitive information, creating both lucrative opportunities for businesses and a wide spectrum of privacy and reputational risks to users. Researchers and advocates are calling for new safeguards around nonverbal behavior and other biometrically derived data collected by VR apps.[23]

Better VR will require advances in body tracking and eye tracking. When combined with other types of sophisticated sensors, VR developers are positioned to make personalized games and experiences that respond differently based on whether a user is perceived to be excited, happy, sad, or bored.[24] Eventually, VR is poised to leverage brain-computer interfaces (BCIs) like electroencephalogram (EEG) sensors and other types of user biometric or health information to aid with immersion.[25] And marketers are eager to capitalize on immersive tech, creating a new environment to bombard kids with ads.[26] Facebook's market dominance in VR also raises concerns due to the company's problematic track record in terms of privacy and desire to unify its users' social media and VR activities.

What types of personal information can be collected by a VR headset?

- **Device information.** Devices can include log files that include information about how VR hardware and software is used and can record vast amounts of technical data.
- **Location information.** Devices can collect approximate location information based on IP address and may derive precise geolocation data and other location information from data collected from the device as well as via Wi-Fi and Bluetooth.
- **Sensor information.** Devices can include cameras as well as motion and depth sensors to collect information about the immediate physical environment and physical movements.
    - **Audio information:** Devices can include microphones that capture audio of the user's voice as well as acoustic sound from the device's surroundings.
    - **Biometrically derived information:** Devices also include inward-facing sensors that can track pupil measurements and gaze as well as iris identification. This type of behavioral data will be useful to control VR experiences and should be considered highly sensitive.

---

[22] Jeremy Bailenson, *Protecting Nonverbal Data Tracked in Virtual Reality*, JAMA Pediatr. (2018), doi:10.1001/jamapediatrics.2018.1909; Miller, M.R., Herrera, F., Jun, H. et al., Personal identifiability of user tracking data during observation of 360-degree VR video, Sci Rep 10 (2020), doi: doi.org/10.1038/s41598-020-74486-y.

[23] *See* Joseph Jerome, Establishing privacy controls for virtual reality and immersive technology, IAPP (Sept. 9, 2020), https://iapp.org/news/a/establishing-privacy-controls-for-virtual-reality-and-immersive-technology/. Though some industry stakeholders like ITIF have cautioned against extending compliance requirements to biometric information, the FTC is currently considering whether biometric data ought to be included in the definition of personal information under the Children's Online Privacy Protection Act (COPPA). This type of data has also been a primary concern among lawmakers advancing U.S. state and federal privacy proposals.

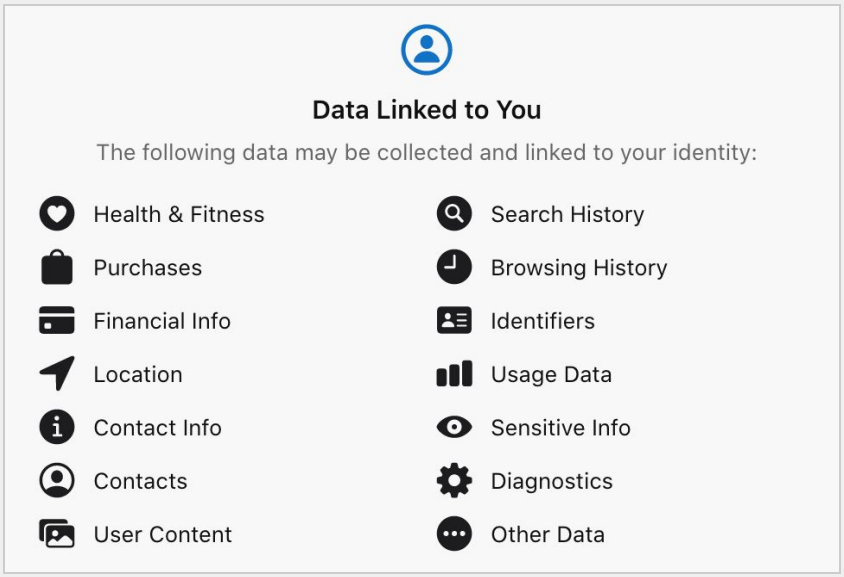
[24] Victor Tangerman, Expert: VR Headsets Should Have Brain Interfaces, Futurism (Mar. 26, 2019), https://futurism.com/brain-computer-interface-vr-headsets.

[25] Id.

[26] Avi Bar-Zeev, The Eyes Are the Prize: Eye-Tracking Technology Is Advertising's Holy Grail, Motherboard (May 28, 2019), https://www.vice.com/en_us/article/bj9ygv/the-eyes-are-the-prize-eye-tracking-technology-is-advertisings-holy-grail; IAB, Augmented & Virtual Reality Glossary 2018, at 25, *available at* https://www.iab.com/wp-content/uploads/2018/07/IAB_VR-AR_Glossary_v5b.pdf.

- **Usage and technical information.** Devices can collect information about the apps used and purchased on VR platforms, including application telemetry, "time spent using app" features, and interactions with other users.

All of this VR-specific information can be combined with other personal information companies possess to create a detailed digital portrait of a VR user.



Apple's new privacy labels identify the following as information collected and linked to users of the Oculus app on the iOS App Store.

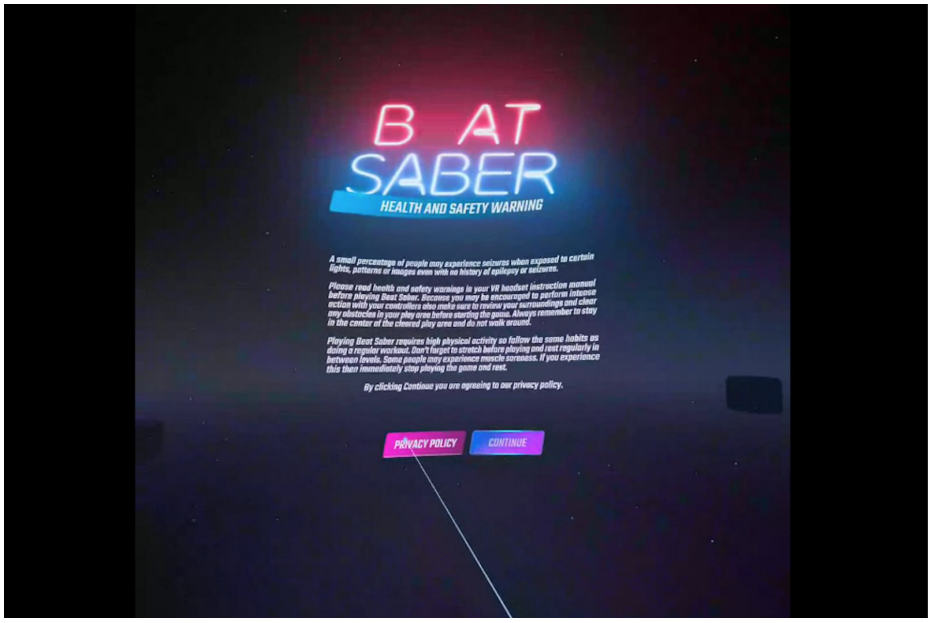
A. Existing privacy laws are already relevant to policing data practices in VR.

These larger issues may be secondary concerns to companies' efforts to ensure devices, like the Oculus Quest, comply with existing privacy laws and reasonable data security expectations. Important laws include the Children's Online Privacy Protection Act (COPPA), which regulates the collection of personal information from children under 13, and broader privacy rules like the California Consumer Privacy Act (CCPA) and the European Union's General Data Protection Regulation (GDPR). Efforts to bring VR headsets into the classroom or to improve child health will not just need to be done equitably but also will require additional protections to meet health and student privacy laws.

It is essential that VR meets not just the letter but also the spirit of these laws, and communicating the capabilities of VR is a good place to start. Even Facebook acknowledges that VR presents new challenges in meaningfully communicating data practices, particularly around location mapping and eye-tracking features.[27] Unfortunately, the gap between what VR privacy policies disclose and the current capabilities of VR headsets and their accompanying sensors is confusing and unclear. Creative approaches to communicating and discussing privacy features in VR are lacking. One unfortunate example of how existing failures to clearly communicate privacy practices is illustrated by the popular VR game Beat Saber. The game begins with a massive, eye-catching "Health and Safety Warning" that users are compelled to click through at the same time as they agree to the game's privacy policy.

[27] Erin Egan, Facebook, Communicating Towards PeopleCentered and Accountable Design 10 (July 2020), *available at* https://about.fb.com/wp-content/uploads/2020/07/Privacy-Transparency-White-Paper.pdf.

This sort of consent bundling is far too common. It becomes an easy way for companies to get individuals to agree to have their data collected and used in ways they cannot begin to understand.[28] Unfortunately, business-friendly stakeholders are already expressing skepticism about extending privacy protections around biometrics in immersive technologies,[29] and using the data needed to fuel VR to supercharge targeted advertising will prove contentious. As a first step, however, VR companies can do a better job to more clearly convey their plans for how to use VR data.



Indicating where to access Beat Saber's Privacy Policy at the bottom of its health and safety warning.

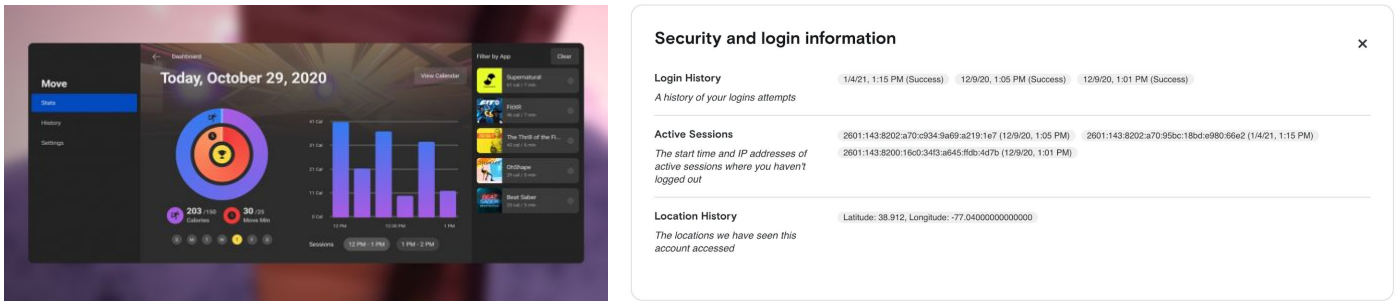
Comprehensive privacy laws like the CCPA and GDPR also give individuals the right to access the information collected from them by VR platforms. What should the ability of kids and parents to access and review information generated by a VR headset look like? The depth and breadth of how companies respond to data access requests has always been all over the map. Under the EU's GDPR, access requests have been used to divulge hundreds of pages of information about people's app usage habits, and one FIFA game player learned he spent $10,000 on in-game purchases over a two-year period.[30]

[28] Ample research has addressed the limitations of relying on consent to control and legitimize collection and use of personal information. Individuals cannot easily read privacy disclosures or assess risks, and this challenge is amplified for children. *See* Neil Richards & Woodrow Hartzog, The Pathologies of Consent, 96 Wash. U. L. Rev. 1461 (2019). Both the volume of data involved and the potential of immersive tech further challenge reliance on consent as a way to solve privacy problems.

[29] Ellysse Dick, ITIF, How to Address Privacy Questions Raised by the Expansion of Augmented Reality in Public Spaces (2020), https://itif.org/publications/2020/12/14/how-address-privacy-questions-raised-expansion-augmented-reality-public.

[30] Wesley Yin-Poole, FIFA player uses GDPR to find out everything EA has on him, realises he's spent over $10,000 in two years on Ultimate Team, Eurogamer (July 25, 2018), https://www.eurogamer.net/articles/2018-07-23-fifa-player-uses-gdpr-to-find-out-everything-ea-has-on-him-realises-hes-spent-over-usd10-000-in-two-years-on-ultimate-team.

Generating technical logs and reams of technical information from an Oculus Quest 2 seems less than useful, but there's no question revealing and actionable data can be made available about how kids' use VR. For example, Facebook has rolled out features like Oculus Move, which tracks physical activity when using an Oculus headset and stores that information locally on-device and not shared with Facebook for now. This information is presented far more usefully here than in Oculus' data access portal.



A mock-up of Facebook's Oculus Move display in comparison to a snapshot of what personal information is made available in response to a data access request.

Bringing VR to a younger audience will also require a more thoughtful approach to COPPA compliance. VR headsets have historically had minimum age guidelines, often restricting permissible use to users older than 13.[31] There is no clinical basis for these recommendations; rather, age restrictions are more about avoiding liability under COPPA.[32] The law applies to operators of online services directed to children younger than 13 or that have actual knowledge that they are collecting, using, or disclosing personal information from children under 13.[33] When VR headsets cost $1,000 and were primarily used by tech enthusiasts, it was easier to pretend that children weren't using VR, but headsets like the Oculus Quest 2 are designed to appeal to the mass market, with commercials prominently featuring kid-friendly experiences like Star Wars and Beat Saber.

It is an open question whether kid-friendly or COPPA-compliant VR will compromise immersive experiences. COPPA broadly requires that online services get verifiable parental consent before collecting personal information from young children, though it permits collection of data for so-called internal operations. The social VR app Rec Room, for example, attempts to detect users younger than 13 and offers COPPA-compliant "junior accounts" that remove many of the app's social features.[34] While COPPA has requirements that go beyond parental content, it is rooted in a notice-and-consent framework for which VR platforms and developers are already doing the bare minimum. Common Sense has been supportive of the Age Appropriate Design Code, which instead asks companies to consider the best interests of children and empower them online, and VR companies are in a prime position to leverage and operationalize the Age Appropriate Design Code to better protect children's data online.

[31] Caroline Knorr, Virtual Reality Gear Kids Will Be Begging for This Holiday, Common Sense Media (Oct. 10, 2016), https://www.commonsensemedia.org/blog/virtual-reality-gear-kids-will-be-begging-for-this-holiday.

[32] *E.g.*, Ben Lang, Parents Who Gift Quest 2 to Kids Under 13 Years Old are in for an Unfortunate Surprise, Road to VR (Dec. 26, 2020), https://www.roadtovr.com/oculus-quest-2-facebook-account-required-age-13-years-old/.

[33] 15 U.S.C. §§ 6501 et seq.

[34] Rec Room, Junior Accounts, https://recroom.happyfox.com/kb/article/19-junior-accounts/ (last visited Jan. 25, 2021).

B. Respecting virtual identity will be an important component of privacy protection in VR.

How users, including children, present themselves in VR is incredibly important, and digital avatars are a way for VR users to broadcast how they want to be viewed by friends and strangers alike. Digital identity can be hugely influential on young people, for good or for ill. Avatars and filters can seem like harmless fun, but equity and gender identity considerations are worthy of special consideration. For example, Snapchat developed a Bob Marley selfie-lens to promote April 20th, raising questions about digital blackface and promoting drug culture stereotypes.[35] Sephora Virtual Artist allows people to try on makeup in a virtual environment, but the clear commercial benefits of digital makeup still warrant considering whether this application could have a negative effect on body image.[36] These types of VR (or AR) filters may have spillover effects on users' physical bodies and sense of self. "Snapchat dysmorphia," for instance, is a new term used to describe the trend of people getting plastic surgery to look like the versions of themselves that appear in social media filters.[37]

Immersive tech has been presented as a way to alter behavior and make users more empathetic. Studies have shown how humans can succumb to Proteus effects, which are physical changes in attitude and behavior that result from users' identities in virtual environments.[38] The body shape and physical appearance of a VR avatar can have real-world impacts on behavior. The Virtual Human Interaction Lab at Stanford University has documented how users' real and virtual identities can be influenced, altering how VR users focus and concentrate and undertake basic social interactions.[39] These psychological phenomena present difficult questions about how VR platforms and even other VR users can manipulate kids' behavior via digital experiences.

VR highlights the need for clear guardrails around design practices that impair user autonomy, decision-making, or choice. Common Sense has long been concerned with the rise of dark patterns, which can trick and manipulate kids into sharing more information than they should or engage in risky activities online.[40] These sorts of user-interface concerns are more pronounced in VR, and some advocates have begun calling for some form of formalized institutional review board for VR experiences.[41] Improving VR shouldn't come at the cost of experimenting on kids.

---

[35] Kwame Opam, Snapchat enables tasteless Bob Marley selfie lens for 4/20, The Verge (Apr. 20, 2016), https://www.theverge.com/2016/4/20/11467160/snapchat-bob-marley-selfie-lens-420.

[36] Adi Robertson, Augmented reality makeup is the future, The Verge (Apr. 19, 2017), https://www.theverge.com/2017/4/19/15347054/augmented-reality-makeup-facebook-live-future; Ashley Carman, Sephora's latest app update lets you try virtual makeup on at home with AR, The Verge (Mar. 16, 2017), https://www.theverge.com/2017/3/16/14946086/sephora-virtual-assistant-ios-app-update-ar-makeup.

[37] Broadly Staff, I Got Surgery to Look Like My Selfie Filters, Vice (Dec. 6, 2018), https://www.vice.com/en_us/article/mby5by/cosmetic-plastic-surgery-social-media-seflies.

[38] René Reinhard et al., Acting your avatar's age: effects of virtual reality avatar embodiment on real life walking speed, Media Psychology, 23:2, 293-315 (2020), doi: 10.1080/15213269.2019.1598435.

[39] A number of relevant studies are available at the Stanford Virtual Human Interaction Lab, https://vhil.stanford.edu/projects/ (last visited Jan. 25, 2021).

[40] *See* Press Release, Senators Introduce Bipartisan Legislation to Ban Manipulative 'Dark Patterns' (Apr. 9, 2019), https://www.warner.senate.gov/public/index.cfm/2019/4/senators-introduce-bipartisan-legislation-to-ban-manipulative-dark-patterns.

[41] Jessica Outlaw & Susan Persky, *Industry review boards are needed to protect VR user privacy*, World Economic Forum (Aug. 29, 2019), https://www.weforum.org/agenda/2019/08/the-hidden-risk-of-virtual-reality-and-what-to-do-about-it/.

Common Sense recommends that VR platforms and app developers:

- Improve privacy notices and begin making VR-specific data disclosures, including explaining how any biometrically derived data can be collected or used, both prior to purchase and through just-in-time notices.
- Limit profiling and ban behavioral advertising using sensitive VR data for children and teens, and do not merge any VR profile with data collected outside the headset.
- Avoid making any inferences (including about mood states) that can discriminate against or harm VR users.
- Better articulate what data minimization policies mean in the context of virtual reality. VR platforms and app stores must better enforce their developer terms, which often include data collection and use restrictions, and extend those limits to themselves.
- Mitigate problematic effects from VR experiences that can manipulate VR users and consider specifically how virtual identity can be protected.

III. The quality and caliber of how digital platforms moderate content online ranges wildly, but VR platforms must be held accountable for creating safer virtual environments.

There's a tremendous amount of potential in social VR.[42] Immersive tech is designed to provide new forms of social interaction. For instance, Facebook Horizon has been promoted as an important social application for the Oculus platform and, like many social VR platforms, has a cartoony aesthetic appealing to children.[43] Yet while Facebook can be held accountable for Horizon, a different set of policies and safety tools exists on different social VR platforms, including:

- Controlling a user's virtual personal space.
- Blocking (or "allow" lists), muting, and reporting controls.
- Different public and private zones.
- Human and automated moderation of VR users and content.

Social VR can exacerbate experiences of harassment and toxicity already prevalent online and across social media. Unfortunately, early research suggests that harassment is commonplace in VR, with 49% of women reporting instances of sexual harassment and 30% of men reporting racist or homophobic comments.[44] Younger users already are using social VR apps like VRChat and Rec Room, suggesting the time is now to begin addressing kids' exposure to virtual spaces and implementing useful protections.[45]

[42] *See* ADL, Hate in Social VR, Hopes and Fears for the Future of Social Virtual Reality (2018).

[43] *See* Horizon, https://www.oculus.com/facebook-horizon/ (last visited Jan. 25, 2021).

[44] Jessica Outlaw, Virtual Harassment: The Social Experience of 600+ Regular Virtual Reality Users, ExtendedMind (2018), https://extendedmind.io/blog/2018/4/4/virtual-harassment-the-social-experience-of-600-regular-virtual-reality-vrusers.

[45] Divine Maloney, Guo Freeman, and Andrew Robb, It Is Complicated: Interacting with Children in Social Virtual Reality, 2020 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW), pp. 343-347, doi: 10.1109/VRW50115.2020.00075; Divine Maloney, Guo Freeman, and Andrew Robb, A Virtual Space for All: Exploring Children's Experience in Social Virtual Reality. Proceedings of the Annual Symposium on Computer-Human Interaction in Play. Association for Computing Machinery (2020), pp. 472–483, doi:https://doi.org/10.1145/3410404.3414268.

A. Virtual harassment is a real and growing problem.

Both cyberbullying and harassment may be especially harmful in virtual reality for two reasons. First, interactions can feel real when you're in VR. The powerful sense of presence and embodiment, combined with voice chat, can make violations of personal space more egregious.[46] And second, it can be difficult for parents to easily monitor what their kids are experiencing unless parents take advantage of casting functionality, which streams what is being seen in VR to another device. As a result, parents will have a much harder time glimpsing what their children do in a VR headset.

The author poses for a virtual selfie before an explanation of the community standards in the tutorial to AltspaceVR.

Best practices for implementing moderation, content reporting, and other safety solutions in VR are in their infancy. Like their social media counterparts, most social VR apps include broad community guidelines that condemn hate and harassment. Studies have shown that posting clear and digital rules promotes prosocial behaviors and can deter casual violations online,[47] and apps like AltspaceVR ensure new users get to see top-level community standards when first entering the app. But it's not enough merely to communicate community guidelines. A robust commitment to creating a positive virtual community and ensuring volunteers and moderators have the resources they need is essential -- and increasingly a legal and regulatory requirement.

The Age Appropriate Design Code published by the U.K. Information Commissioner's Office requires platforms to uphold their user behavior and content policies.[48] The code distinguishes between active automated or human moderation and "back-end" approaches, such as user reporting, and cautions that the risks to children of relying on only back-end (or other "light-touch") processes are not sufficient. As VR platforms attempt to make their apps and services suitable for children, they will need to ensure their promises. For example, if online harassment and cyberbullying are purportedly not tolerated in written terms, adequate controls need to be in place to address such incidents swiftly and effectively.

---

[46] L. Blackwell, N. Ellison, N. Elliott-Deflo and R. Schwartz, Harassment in Social VR: Implications for Design, 2019 IEEE Conference on Virtual Reality and 3D User Interfaces (VR), pp. 854-855, doi: 10.1109/VR.2019.8798165.

[47] J. Nathan Matias, Posting Rules in Science Discussions Prevents Problems & Increases Participation (Apr. 29, 2019), https://civilservant.io/moderation_experiment_r_science_rule_posting.html.

[48] UK Information Commissioner's Office, Age appropriate design: a code of practice for online services, Policies and community standard (2020).

Balancing privacy and safety in virtual environments

Policies and technical measures to address inappropriate content and harmful interactions in virtual environments can come into tension with user privacy. For example, an Oculus headset will capture a user's experience "on a rolling basis" in local storage for review by moderators of its Horizon VR social platform.[49] Facebook's moderators can be invited to invisibly observe users in real-time to ensure they live up to the platform's community standards. While these roving ghost moderators can be summoned when a user reports a complaint, they can also appear when other sorts of signals, including rapid blocking or muting, are detected by Facebook.[50]

The head of Facebook Reality Labs has called for separating out content moderation from user privacy in VR.[51] Though it is true these are two different domains, Horizon demonstrates how the need to police user behavior -- and monitor content -- challenges the capacity of VR users to avoid tracking and could have unexpected chilling effects.[52] This may be unavoidable, but Horizon's current implementation does not inform users when moderators are observing. Discreet monitoring undermines trust, and as Common Sense has recommended, safeguards that encourage open dialog are more likely to be helpful.[53]

B. Designing safe, inclusive, and prosocial virtual environments is a must.

Designing safe and inclusive virtual experiences is a priority for a number of leading VR designers and advocates.[54] One approach is to create very clear physical zones and social spaces in VR, but VR apps and services should also provide more transparency about their work and engage with outside stakeholders.[55]

Providing parents with the tools to restrict access to certain VR content is one place to start, but we also need more information about how virtual communities operate, how users are exposed to content, and how community standards are enforced. Further, while a focus on social environments is important, we must recognize that immersive tech provides other avenues to share user-generated content. For example, 3D art application Tilt Brush provides a boilerplate instruction not to use the service to create violent imagery.[56] This raises tough questions about how to identify violent imagery and what should be done about it.

[49] Facebook Horizon Invite-Only Beta Is Ready For Virtual Explorers, Oculus Blog (Aug. 27, 2020), https://www.oculus.com/blog/facebook-horizon-invite-only-beta-is-ready-for-virtual-explorers.

[50] Ben Lang, In 'Horizon' Facebook Can Invisibly Observe Users in Real-time to Spot Rule Violations, Road to VR (Aug. 28, 2020), https://www.roadtovr.com/facebook-horizon-privacy-monitoring-moderation/.

[51] Adi Robertson, Why Facebook's "One Identity" Rule Has to Change for VR, Verge (Jan. 13, 2021), https://www.theverge.com/22221251/facebook-reality-labs-boz-andrew-bosworth-interview-privacy-moderation-horizon-ar-vr.

[52] Scholars Woody Hartzog and Evan Selinger have suggested that an individual's ability to remain "obscure" is a better framing than privacy when it comes to digital platforms and personal data. Woodrow Hartzog & Evan Selinger, Obscurity: A Better Way to Think About Your Data Than "Privacy," The Atlantic (Jan. 17, 2013), http://www.theatlantic.com/technology/archive/2013/01/obscurity-a-better-wayto-think-about-your-data-than-privacy/267283/.

[53] Parents' Ultimate Guide to Parental Controls, Common Sense Media, https://www.commonsensemedia.org/blog/parents-ultimate-guide-to-parental-controls (last visited Jan. 25, 2021).

[54] Michelle Cortese & Andrew Zeller, Designing Safer Social VR (Nov 1, 2019), https://immerse.news/designing-safer-social-vr-76f99f0be82e.

[55] *See* XR Association, Creating Safe, Inclusive, and Respective Immersive Experiences (Dec. 2019), https://xra.org/research/xr-primer-2-0-a-starter-guide-for-developers/; *see also* Cyber-XR Coalition Immersive Technology Standards for Accessibility, Inclusion, Ethics, and Safety (2020), *available at* https://www.cyberxr.org/xr-standards/.

[56] *See* Tilt Brush License and Brand Guidelines, https://support.google.com/tiltbrush/answer/7203483?hl=en (last visited Jan. 25, 2021).

One lesson from the spread of conspiracy theories online over the past year has been the difficulties in monitoring Facebook groups and understanding how content is surfaced on YouTube. The Anti-Defamation League and the Fair Play Alliance, which is supported by major game publishers like Electronic Arts, have collaborated on a new framework for evaluating harms and disruptive behaviors in online games, much of which could be applicable to virtual spaces.[57] This framework has a number of useful suggestions for next steps, including (1) developing measures for what constitute online disruption and community health and (2) investing in best practices that promote prosocial design to boost empathy, trust, and digital well-being.

Common Sense recommends that VR platforms and app developers:

- Develop easier methods and functionality to stream or cast VR content to a mobile device, laptop, or television, so parents can monitor and share in their children's VR experiences.
- Communicate and reiterate behavior expectations at regular intervals, using plain language and positive reinforcement. Ensure that any kid- and teen-friendly VR environments are appropriately staffed with human moderators.
- Provide transparency about how content and behavior is moderated to users and the wider public, including providing access to information to let individuals understand their reputation in VR and when their behavior is being monitored.
- Work with child-safety experts to establish policies and design guides that can be shared with the public, including expectations for virtual citizenship.

IV. Effective parental controls need to be built for VR platforms and expanded to account for the unique features of immersive tech.

Parents are interested in a variety of different online safety controls and privacy settings, though making these tools easily accessible and usable by parents is a fundamental challenge. VR presents itself as a combination of game console, app store, and social platform. Divvying up the entertainment and educational use cases for VR is another concern.

At minimum, parents need to have the ability to:

- Filter VR content, such as limiting exposure to profanity or violence.
- Manage contacts and communications, such as limiting tweens interactions with adults.
- Monitor and limit children's activity and device usage.
- Approve any apps children attempt to download and limit or block in-app purchases.[58]

Commercial VR headsets are primarily used for gaming,[59] so modeling safety features off of those offered by major game consoles may make sense. But considering immersive tech's potential to become a major boon for education and social events, VR headsets are no mere gaming device. They can be a means of engaging in an alternate reality, complete with the potential for physically immersive interactions with bullies and other harassers, creating impacts that transcend an individual game session or experience.

[57] ADL, Disruption and Harms in Online Gaming Framework (2020), https://www.adl.org/fpa-adl-games-framework.

[58] Tools for Today's Digital Parents, Family Online Safety Institute (Nov. 2020), *available at* https://www.fosi.org/policy-research/tools-for-todays-digital-parents.

[59] XRDC AR/VR Innovation Report (2019). See also 2019 Augmented and Virtual Reality Survey Report at 11, XR Association & Perkins Coie, *available at* https://www.perkinscoie.com/images/content/2/1/v4/218679/2019-VR-AR-Survey-Digital-v1.pdf (noting that 61% of respondents highlight gaming as the most applicable industry for immersive tech).

A. Ratings are critical for filtering and controlling access to VR experiences.

Privacy and content ratings systems will be a cornerstone of any parental controls. While VR games on Steam do not require a rating, the Oculus store requires any title to have age and content ratings assigned through the International Age Rating Coalition (IARC) process.[60] In the United States, these are the ESRB ratings, which are required by Microsoft, Nintendo, and Sony for all content published on their platforms. Their respective consoles leverage these ratings to limit what types of games can be accessed by younger users. Translating this functionality to VR platforms is a no-brainer, but it's worth considering whether a more fulsome ability to filter VR content is needed.

The ESRB's approach to ratings can be reactive, as its belated approach to requiring notices for lootboxes illustrates.[61] Ratings also do not capture the full range of risks that occur in online games, including social VR platforms. On top of that, while the ESRB acknowledges that VR is a completely different experience,[62] it does not rate VR experiences any differently from games played on traditional screens. This is an issue because VR experiences are fundamentally different from traditional video games: Oculus currently includes a separate comfort rating that takes into account how much camera movement, player motion, or disorienting content and effects an app has.[63] Online interactions like bullying, harassment, and inappropriate sexual interactions are major challenges not captured by ratings.

Other VR developers have called for presence ratings that capture the intensity of the experience.[64] We do not yet know how immersive tech impacts children,[65] but it may be a powerful trigger for emotional and psychological issues that could affect childhood development.[66] The intensity of graphic violence in an immersive environment may once again restart discussions about the role of violence in gaming. Gun Club VR, for example, is rated "E for Everyone," even as it markets itself as the "ultimate virtual weapon simulator" with the "only thing missing [being] the smell of the gunpowder."[67]

VR has not yet experienced its "Mortal Kombat" moment, which generated congressional hearings and gave birth to the ESRB in the mid-'90s, but the immersive capabilities of VR combined with the sorts of psychological profiling driving more personalized gaming may warrant offering more granular options for parents to control VR experiences.[68] More independent research is needed.

---

[60] Oculus Developer Blog, Oculus Store Transitions to IARC Age and Content Ratings (Jan. 17. 2017), https://developer.oculus.com/blog/oculus-store-transitions-to-iarc-age-and-content-ratings/.

[61] *Compare* Nick Statt, ESRB's loot box response is new 'in-game purchases' label that applies to almost every game, Verge (Feb. 27, 2018), https://www.theverge.com/2018/2/27/17058400/esrb-in-game-purchases-label-microtransactions-loot-boxes-regulation-oversight, *with* Jay Peters, ESRB introduces a new label to indicate that a game has loot boxes, Verge (Apr. 13, 2020), https://www.theverge.com/2020/4/13/21219192/esrb-new-label-loot-boxes-gacha-game.

[62] Reality 101: Reality 101: Introduction to Virtual Reality, ESRB Blog (Oct. 13, 2016), https://www.esrb.org/blog/reality-101-introduction-to-virtual-reality/.

[63] Where can I view the comfort rating for Oculus Store content?, Oculus Support, https://support.oculus.com/comfort/?locale=en_US (last visited Jan. 25, 2021).

[64] Ben Kuchera, How should parents treat violence in virtual reality?, Polygon (Feb. 26, 2016), https://www.polygon.com/2016/2/26/11120792/how-should-parents-treat-violence-in-virtual-reality.

[65] Edd Gent, Are Virtual Reality Headsets Safe for Children?, Scientific American (Oct. 4, 2016), https://www.scientificamerican.com/article/are-virtual-reality-headsets-safe-for-children/. *See also*

Lawrence Tychsen & Paul Foeller, Effects of Immersive Virtual Reality Headset Viewing on Young Children: Visuomotor Function, Postural Stability, and Motion Sickness, Am J Ophthalmol. (Jan. 2020), pp. 151-159. doi: 10.1016/j.ajo.2019.07.020.

[66] Benjamin Herold, Virtual Reality for Learning Raises High Hopes and Serious Concerns, EducationWeek (Feb. 8, 2018), https://www.edweek.org/technology/virtual-reality-for-learning-raises-high-hopes-and-serious-concerns/2018/02.

[67] Gun Club VR, https://store.steampowered.com/app/691320/Gun_Club_VR/ (last visited Jan. 25, 2021).

[68] Joseph Jerome, Video Games and Privacy: It's All About Trust, Gamasutra (Apr. 20, 2014), https://www.gamasutra.com/blogs/JosephJerome/20140520/217964/Video_Games_and_Privacy_Its_All_About_Trust.php.

B. Screen time in VR must be monitored and further researched.

Widespread adoption of VR may also impact how families think about screen time. Useful parental controls must provide tools to limit usage, or at least inform users about how long they have used a VR headset. Going back to 1995, Nintendo's Virtual Boy included a built-in software timer that reminded users every 15 minutes to pause and rest their eyes.[69] Research suggests that a VR lens may have little impact on children's vision,[70] but eye strain and discomfort remain concerns with VR headsets.

Common Sense has previously endorsed keeping virtual experiences to 20 minutes, but at minimum, parents should be able to set time limits and receive usage reports with varying degrees of detail, like with other game consoles. VR can also be an alternative way to watch movies and television, with the Netflix VR app emulating a 25-foot theater experience.[71] The need for additional research and guidance on exposure to VR experiences over time is obvious, and VR developers should develop a philosophy on screen time in VR.

Common Sense recommends that VR platforms and app developers:

- Implement ratings-based controls that allow parents or guardians to filter VR experiences and enable parents to restrict access to specific VR games or experiences by default at system setup. Parents should also be able to block certain types of interactions such as with adults or complete strangers.
- Expand app ratings to capture immersive experiences unique to VR and undertake research to better standardize settings for comfort and accessibility.
- Provide not only notices to users about VR screen time and reports about individual app usage, but also tools to set app-specific time limits or periods where apps cannot be used. Young users should also be encouraged to set their own time limits (especially if a parent has not), and platforms can guide them in this effort.
- On the other side, provide age appropriate resources to explain parental controls to the child so that they are aware that their activity is being monitored. VR platforms should proactively provide resources to parents to facilitate conversations about what and when parental monitoring is appropriate and how kids can self-monitor their use of VR.

Tensions exist among efforts to better safeguard privacy and monitor content, and the appropriate role of parents in this process is in flux. Still, clearer rules and safeguards in VR need to be better established. Two years ago, Common Sense cautioned that it would be more important than ever for parents to be aware of the content that kids are encountering in VR, yet this task is harder than ever. Now it will be up to the developers of VR headsets and platforms like Oculus to make that a reality.

[69] Benj Edwards, Unraveling The Enigma Of Nintendo's Virtual Boy, 20 Years Later, Fast Company (Aug. 21, 2015), https://www.fastcompany.com/3050016/unraveling-the-enigma-of-nintendos-virtual-boy-20-years-later.

[70] Virtual Reality 101, at 16-17.

[71] Justin Kirkland, The Artful Opulence of Watching Netflix With the Oculus Quest 2 Proves VR Isn't Just for Gaming, Esquire (Oct. 7, 2020), https://www.esquire.com/lifestyle/health/a34272437/oculus-quest-2-virtual-reality-headset-netflix/.