Research Ethics Guidelines for Extended Reality Studies Involving Children

Preliminary Report

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Executive Summary

Research ethics frameworks, such as the Declaration of Helsinki, provide high-level guidance on the ethics of conducting research, but they can be difficult to apply to emerging research topics. Extended reality (XR) technologies are an emerging technology for children and XR research involving children is becoming more common. Within the context of this report, we define XR as virtual, augmented, or mixed reality experiences delivered through a wearable device (e.g., a headset or smart glasses). To develop research ethics guidelines for XR studies with children, we pursued a strategy involving:

- participatory activities conducted by six universities in the United States involving more than 200 children and over 200 adult stakeholders (e.g., parents/caregivers, teachers), followed by
- a three-day in-person meeting between the researchers from those six universities to synthesize results into guidelines, followed by
- a probability sample survey of 2,000 adults in the United States to validate these guidelines (inclusion criteria being parents of minors or professionals who work with children)*

The guidelines highlight the importance of research motivations, addressing side effects, involving parents/caregivers and other stakeholders, investigating novel forms of consent and assent, and avoiding certain types of data processing.

***This preliminary report was written based on partial completion (1,298) of the 2,000 respondent probability sample survey. We will release a final report once the survey is complete and we are able to analyze its results.**

Guidelines

We organized guidelines by the stage of a research project, from motivation, to ethical approval, consent assent and compensation, participants, procedures, data collection, privacy, and confidentiality, reporting of results, and dissemination. Under each stage, we classify guidelines under “must”, “should”, and “should consider” categories. We consider guidelines under the “must” category critical, and researchers conducting XR studies with children must follow these guidelines. For guidelines under the “should” category, researchers should either follow them or explicitly report any limitations in doing so and/or alternative approaches taken to achieve the same goals. For guidelines under the “should consider” category, researchers should consider them and discuss their approach to them in any reports or publications.

Note that one of the guidelines researchers must follow is to have research protocols reviewed by an Institutional Review Board (IRB) or Ethics Board. Hence, the guidelines we provide, while in some cases may overlap with typical requirements from an IRB or Ethics Board, are intended to be used in addition to requirements from IRBs or Ethics Boards.

Motivation

Researchers must:

- Ensure that XR research involving children focuses on topics that could provide benefits to society and/or prevent harm from occurring.
- Critically reflect on the possible benefits and harms that may result from their proposed ideas. In new research areas or areas of disagreement, extra focus should be placed on a risk-benefit analysis.

Researchers should:

- When conducting risk-benefit analyses of research ideas, ask questions like:
    - Who is affected by the outcomes?
    - Who is conducting the risk-benefit analysis (researchers, stakeholders such as children or parents, other experts)?
    - Can stakeholder concerns be taken into account in study design (see Appendix)?
    - Can focus be placed on stakeholder-identified positive applications (see Appendix)?

Researchers should consider:

- Involving groups of stakeholders in a risk-benefit analysis of the research topics being pursued, including:
    - Panels of parents and professionals who work with children
    - Panels of children
    - Panels of experts (e.g., on children or XR)
    - External evaluators (more involved than panel of experts, advising throughout project)

External Approval/Involvement/Verification

Researchers must:

- Have research protocols reviewed and approved by an Institutional Review Board (IRB) or Ethics Board before studies are conducted. While many organizations are required to pursue this process, we find it critical that researchers not conducting research through such an organization still have their studies reviewed by an IRB or Ethics Board.

Researchers should consider:

- Consulting the following groups with respect to research protocols for additional expertise that is often not present in IRBs or Ethics Boards:
    - Panels of parents and professionals who work with children
    - Panels of children
    - Panels of experts (e.g., on children or XR)
    - External evaluators (more involved than panel of experts, advising throughout project)

Consent, Assent, and Compensation

Researchers must:

- Develop age-appropriate assent procedures for children, including appropriate language and media for the target age group.
- Ensure that children do not feel pressured to participate in the study or remain in the study once it has begun. Researchers must regularly monitor for signs of distress after assent to make sure that children are participating of their own free will.

Researchers should:

- When possible, enable parents/caregivers to try out the technology used during the consent process. When possible, children should also be able to try the technology used during the assent process. As an alternative, consider showing a video of what the study will be like.
- Approach consent dynamically, and communicate to participants if something new is discovered. This is particularly important for emerging technologies, such as XR, which are quickly changing and with which there are limited experiences with children.

Researchers should consider:

- Evaluating assent procedures with a pilot group to ensure that children have a sufficient understanding.
- Disclosing to participants any mandatory reporting requirements research staff may have.
- Providing compensation based on cost/effort to bring children to the study, which may be different based on different costs to parents/communities. For example, transportation costs, and costs to pay for a sitter for other children should be taken into account.

Participants

Researchers should:

- Be explicit about the reasons behind inclusion/exclusion criteria.
- Recruit a number of participants that is a good match for the research questions being asked (e.g., exploratory vs. controlled studies).

Researchers should consider:

- Recruiting a set of participants that is as representative as possible, including children with disabilities.
- Studies that involve and benefit primarily children with disabilities.
- If conducting a study in a setting with multiple children (e.g., a school), have alternative activities available for children who are unable to participate in the study (like classmates, siblings of participants, children who do not assent, etc) with similar or alternative benefits.

Procedures

Researches must:

- Have methods that reduce the potential of adverse effects (e.g., headaches, dizziness), have protocols in place for managing adverse effects when they occur, and record any such events.
- Ensure devices, content, tasks, and study duration are appropriate for child participants' physiology and cognitive development. This may include:
    - Lighter glasses to minimize size effects
    - Simplified interfaces
    - Enhanced comprehension tools
    - Personalization where possible
    - Monitoring of usage time

Researchers should:

- Enable parents/caregivers of younger children to monitor their children's use of XR devices during a study (e.g., see what the children are seeing through XR devices). Consider this option for older children as appropriate.
- For lab studies, have a structured physical space and monitor physical motion so as to avoid risks such as running into walls or other objects.
- Use procedures that work well for child participants with disabilities. For example, for neurodivergent children, consider:
    - Clearly providing expectations as to what will happen.
    - Being flexible and considering individual adjustments for children who need them.
    - Monitoring adverse effects very closely (e.g. motion sickness).
    - Working with people who know the children well and obtaining accommodation needs.
    - Providing asynchronous interview options, like Asynchronous Remote Community research methods.

Researchers should consider:

- Parent/caregiver involvement during studies based on the needs of the participants.
- Group dynamics when working with multiple children and how best to facilitate interactions.
- Training adult researchers participating in research so they are prepared to interact with children in a safe and developmentally appropriate manner.
- How to make it so children benefit from their participation.
- Avoiding bias in research procedures that may favor a particular outcome (e.g., set up a low bar for success to obtain positive results with respect to XR technology).
- Member checking results of qualitative research (i.e., go back to participants and check if qualitative research outcomes are consistent with their experiences)

Data Collection, Privacy, and Confidentiality

Researchers must:

- Collect data on any adverse effects that occur (e.g., dizziness).
- Not process data in ways that produce models of children, including their faces, bodies, and voices, unless the production and use of the models is clearly disclosed during consent/assent, models are not used for other purposes, and can be completely erased at the request of participants and/or their parents/caregivers.
- Not make children’s data available to people outside the study that could be used to produce models of individual children, including their faces, bodies, and voices.
- Take steps to avoid collecting data that is irrelevant to the study. This is especially important when conducting research outside a lab environment where data from third parties may be accidentally collected. Any such third party or irrelevant data must be immediately and permanently deleted.
- Ensure that only people working on the study have access to the data.
- Take extra caution with personally identifiable information given the level of richness of the data obtained through XR.

Researchers should:

- Erase data when it is no longer needed for the purposes presented to parents/caregivers and children during the consent/assent process.
- Disclose all third party data collection to participants (e.g., data automatically collected by devices and sent to the manufacturer).

Researchers should consider:

- Implementing easy and transparent procedures for participants and/or parents/caregivers to request that their data be deleted.
- Allowinging children to pause and resume data collection, especially in studies conducted outside labs (e.g., when using the restroom).

Reporting of Results

Researchers must:

- Report any adverse effects that participants may have experienced (e.g., headaches).

Researchers should:

- Report with detail on research design and participants in such a way that enables meta-analysis and replication while being consistent with keeping participant confidentiality.
- Develop processes for data availability in accordance with approved procedures from IRBs or Ethics Boards to protect confidentiality.

Researchers should consider:

- Reporting on ethical choices made (e.g., based on a risk-benefit analysis).
- Developing terms of use specifying the intended use of research results to discourage unforeseen negative uses of research results.

Dissemination

Researchers should consider:

- Making data, results, and/or software uses open and free while ensuring they follow best practices in data management, especially considering privacy of research participants.
- Reporting results to all participants and/or their parents/caregivers, preferably in an comprehensible way.
- Making their reports understandable to non-research audiences, such as policymakers, professionals who work with children, and parents.
- Disseminating their results on a larger scale, possibly through routes like:
    - Media outlets (e.g. through university offices)
    - Family groups/non-profits/advocacy groups
    - Other academic fields

Methodology

Participatory Research

Teams at six universities in the United States conducted participatory activities between 2023 and 2025 with a broad range of stakeholders to obtain insights into their views on the ethics of XR technologies for children and the research ethics of XR studies with children. Below, we provide a brief summary of the methods used at each university.

Boise State University

Over the span of a few years, seventeen co-design sessions were conducted with the Boise State University Kidsteam on the topic of extended reality. Kidsteam is an intergenerational design team where adults and children work together as design partners. The team consisted of 8-9 children ages 6-11 and 4-9 adults (faculty, graduate and undergraduate students) depending on the year. The sessions involved learning and reflecting about XR technologies, using a few applications, discussing ethical guidelines, and scenarios of use for children and families, considering end-user license agreements for these devices, designing and conducting formative evaluations on XR worlds and prototypes for XR applications for children and families. Thematic analysis was used to obtain insights from the data.

Northeastern University

The Northeastern University team conducted two sets of activities. The first involved online interviews with 21 neurodivergent children aged 8-13 in which media preferences, reactions to XR scenarios, and XR ethics were discussed (Alper et al., 2025). The second involved a focus group with 12 parents of/clinicians who work with neurodivergent children 8-13. The focus group participants discussed XR scenarios and XR ethics. For both activities, the team analyzed data using descriptive data analysis (quantitative data) and thematic analysis (qualitative data).

Alper, M., Pak, E., McGivney, E., Rubinsztain, V. (2025). “Someone who has ADHD or someone who has autism should make the rules”: A participatory study of neurodivergent child perspectives on the ethics of extended reality technologies, International Journal of Child-Computer Interaction, Volume 46, 2025, 100782, ISSN 2212-8689, https://doi.org/10.1016/j.ijcci.2025.100782

University of Baltimore

The University of Baltimore team conducted one round of participatory research. A total of 34 adult participants were recruited using flyers, social media posts, and community referrals with a focus on participants from low-income urban areas. The sample included:

- 11 parents/guardians residing in or near Baltimore City
- 9 K–12 teachers working within Baltimore City public or charter schools
- 14 recent high school graduates (ages 18–22) from the Baltimore area

Participants took part in three sessions covering the following:

Session 1: Virtual Reality – Exploration of VR capabilities, use cases, and perceived value and risk when applied to children.
Session 2: Augmented Reality – Focused on AR integration into learning and everyday settings, with attention to visibility, privacy, and contextual safety.
Session 3: Ethical Guidelines – Open discussion on ethical frameworks, age-appropriateness, consent, data practices, and equity.
The University of Baltimore team used thematic analysis to analyze the data.

University of Iowa

The University of Iowa team conducted three rounds of participatory research. Two rounds involved adult participants who were parents/caregivers of children aged 2-12, or professionals who worked with children aged 2-12 (e.g., teachers, pediatric nurses). The first round involved 23 participants who participated in multiple sessions including discussions of fears and hopes with respect to technologies and children based on prior literature, in-depth consideration of a broad range of potential use scenarios, explanations of how XR headsets work, and use of commercially available headsets (Hourcade et al., 2024). The second round involved 30 participants who each took part in small group discussions over a broad range of topics related to research ethics with respect to studies involving XR technologies and children. In addition, a third round of research consisted of participatory activities with 9 3-5-year-old children in which they imagined how they would like to use smartglasses (Hourcade et al., 2025). For all activities the University of Iowa team used inductive coding to analyze data.

Hourcade, J.P., Schmuecker, S., Norris, D., Currin, F.H. (2024). Understanding Adult Stakeholder Perspectives on the Ethics of Extended Reality Technologies with a Focus on Young Children and Children in Rural Areas. In Proceedings of the 23rd Annual ACM Interaction Design and Children Conference (IDC '24). Association for Computing Machinery, New York, NY, USA, 455–468. https://doi.org/10.1145/3628516.3655811. Best Paper Award. Social Impact Honorable Mention.

Hourcade, J.P., Schmuecker, S., Norris, D., Onions, M., Gilhoi, A. (2025). Eliciting Preschool Children's Preferences for Augmented Reality Smart Glasses. Proceedings of the 24th Interaction Design and Children. Association for Computing Machinery, New York, NY, USA, 608–621. https://doi.org/10.1145/3713043.3728861

University of Maryland

The University of Maryland team conducted sessions as part of a two-week summer 2025 camp for 17 5th-8th grade boys. Each day of the camp included 3 hours of learning and design activities with a focus on XR. In addition, during two 3-hour sessions, the parents/guardians of the child participants, along with parents from an adjacent girls summer program focused on AI, discussed their perspectives, goals, challenges, and concerns related to their children's use of and learning about XR and AI. Thematic analysis was used to analyze the outcomes of these sessions.

University of Minnesota

The team at the University of Minnesota conducted two rounds of research at the Minnesota State Fair. The first round included 122 participants (67 children ages 7-13, 55 parents/guardians) from 52 families in 56 groups who participated in VR exploration (360° video co-watching), viewing scenario videos, surveys, and semi-structured interviews. Descriptive data analysis (quantitative data), and thematic analysis informed by Grounded Theory (qualitative data) were used to analyze the data (Jin et al., 2024).

The second round included 124 participants in 46 child-involved groups (84 children, 40 guardians; children average age 13.2 years) who viewed speculative scenario videos, collaboratively ranked research priorities using magnetic boards (known as the SIP method), and engaged in group discussions. Plackett-Luce model with cluster bootstrap (quantitative ranking data) and thematic analysis (qualitative data) were used to analyze the data.

Jin, Q., Kawas, S., Arora, S., Yuan, Y., & Yarosh, S. (2024). Is Your Family Ready for VR? Ethical Concerns and Considerations in Children's VR Usage. IDC '24. https://doi.org/10.1145/3628516.3655804

Jin, Q., Yang, X., & Yarosh, S. (accepted). "We Care More About What It Does": Priorities and Responsibilities in VR for Children and Families. IEEE VR 2026.

Additional Sources

In addition to the work conducted at the six sites, we also consulted a publication that provides a framework for research ethics in child-computer interaction based on an analysis of the literature (Read et al., 2025).

Read, J., Horton, M., Fitton, D., & Sim, G. (2025). Child Centred Ethics (CCE): A Practical Framework for Enhanced Child Participation in HCI. In Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems (pp. 1-16).

Developing Guildelines

Two researchers at the University of Iowa took the findings from all sources mentioned above and developed an initial set of guidelines, where each item corresponded to at least one source. Team members from the six universities that conducted participatory activities met for three days in June of 2025 to iteratively improve the guidelines. They then developed survey questions to validate key guidelines with a broader set of stakeholders through a probability sample survey.

Probability Sample Survey

Support for conducting a probability sample survey was provided by the Center for Social Science Innovation (CSSI) at the University of Iowa. The team at the University of Iowa, in collaboration with CSSI, worked on final details of the survey and conducted a pilot survey, recruiting 97 parents/caregivers of minors and professionals who work with children. For this pilot survey, respondents were asked to provide feedback on any difficulty answering or understanding questions. The University of Iowa team used this feedback to make minor modifications to the survey.

The CSSI then worked through Verasight to deploy the survey to obtain 2,000 responses from a probability sample of United States adults.

The respondents were from the Verasight Community, which is composed of individuals recruited via random address-based sampling, random person-to-person text messaging, and dynamic online targeting. All Verasight community members are verified via multi-step authentication, including providing an SMS response from a mobile phone registered with a major U.S. carrier (e.g., no VOIP or internet phones) as well as within-survey technology, including verifying the absence of non-human responses with technologies such as Google reCAPTCHA v3. Those who exhibit low-quality response behaviors over time, such as straight-lining or speeding, are also removed and prohibited from further participation in the community. Verasight Community members receive points for taking surveys that can be redeemed for Venmo or PayPal payments, gift cards, or charitable donations. Respondents are never routed from one survey to another and receive compensation for every invited survey, so there is never an incentive to respond strategically to survey qualification screener questions.

To further ensure data quality, the Verasight data team implements a number of post-data collection quality assurance procedures, including confirming that all responses correspond with U.S. IP addresses, confirming no duplicate respondents, verifying the absence of non-human responses, and removing any respondents who failed in-survey attention and/or straight-lining checks. The Verasight data team also reviewed open-ended items to ensure no responses contained nonsensical, inappropriate, or non-sequitur text. Respondents that completed the survey in less than 30% of the median completion time were removed.

The team at the University of Iowa then used survey results to validate the guidelines. This preliminary report is based on 1,298 responses to the survey.

Appendix

Stakeholder Concerns Identified During Participatory Sessions

- Parents or guardians not knowing what their kids are doing in XR or able to help them appropriately use XR
- Losing control over personal information
- Experiencing scary or inappropriate things online (e.g., bullying)
- Having trouble telling what is real and what is not
- Acting in ways that aren’t okay
- Being dependent on XR
- Feeling sad or worried because of getting too hooked on XR
- Feeling lonely or having a hard time making friends or talking to family
- Not learning or growing in a healthy way
- Feeling sick (like getting dizzy, or getting a headache)
- Getting hurt (like tripping or falling)
- XR devices feeling uncomfortable
- Being unable to use XR because of a disability
- Falling behind other kids who have more tech
- Kids feeling left out if they need to wear XR for a disability

Positive Applications Identified by Stakeholders During Participatory Sessions

Health

- Giving kids a preview of medical procedures so they go easier
- Getting distracted during medical procedures so they don’t feel bad
- Having easier access to doctors and counselors
- Having fun exercising
- Helping kids follow doctors’ instructions
- Helping kids relax
- Helping reflect on emotions

Learning

- Kids with a disability being able to do more things
- Learning school topics
- Learning to be safe in emergencies
- Creating cool things
- Visiting far away places (like a museum or another country)
- Visiting historical times (like ancient Rome)

Communication

- Talking or spending time with friends and family who are far away
- Getting help from parents/caregivers more easily when they are far away
- Help socializing face-to-face
- Making group work with other kids easier

Entertainment

- Giving kids information during events (like a museum visit, or a concert)
- Being in an immersive story
- Making play with physical items more fun

Daily Living

- Having easy access to instructions for daily living tasks (like getting walking directions)
- Understanding kids' abilities at different ages
- Helping children make better decisions