

# “We Don’t Want a Bird Cage, We Want Guardrails”: Understanding & Designing for Preventing Interpersonal Harm in Social VR through the Lens of Consent

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As social Virtual Reality (VR) grows in prevalence, new possibilities for embodied and immersive social interaction emerge, including varied forms of interpersonal harm. Yet, challenges remain regarding defining, identifying, and mitigating said harm in social VR. In this paper, we take an alternative approach to understanding and designing solutions for interpersonal harm in social VR through the lens of consent, which circumvents the lack of consensus and social norms on what should be defined as harm in social VR and reflects the embodied, immersive, and offline-world-like nature of harm in social VR. Through interviews with 39 social VR users, we offer one of the first empirical explorations on how social VR users understand consent as “boundaries,” (re)purpose existing social VR features for practicing consent as “boundary setting,” and envision the design of future consent mechanics in social VR to balance protection and interaction expectations to mitigate interpersonal harm as “boundary violations” in social VR. This work makes significant contributions to CSCW and HCI research by (1) uncovering how social VR users craft novel conceptualizations of consent as boundaries and harm as unwanted boundary violations, and (2) providing three foundational principles for designing future consent mechanics in social VR informed by actual social VR users.

CCS Concepts: • **Human-centered computing** → **Empirical studies in collaborative and social computing**.

Additional Key Words and Phrases: social VR, online social interactions, computer-meditated consent, personal boundaries, interpersonal harm

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## 1 INTRODUCTION

The recent boom of the mass consumer Virtual Reality (VR) market has led to the increasing popularity of various commercial social VR platforms (e.g., VRChat, Rec Room, and Meta Horizon Worlds) where multiple users can interact with one another through their avatar representations, typically via immersive VR technologies such as standalone VR head-mounted displays (e.g., Meta Quest) or external device-assisted VR headsets (e.g., HTC Vive for desktop) [12, 16, 20, 39]. As such,

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social VR has been praised for providing enhanced embodied and immersive social experiences through a novel combination of technical features that traditional on-screen gaming and virtual worlds either do not offer or only offer in a reduced capacity, including full or partial-body tracked avatars (i.e., one's avatar body actions correspond to one's physical body actions in real time), predominate voice communication, body language, gestures, and simulated offline-like immersive activities [16, 39, 55].

However, a growing body of literature in CSCW and HCI is increasingly concerned with how social VR may introduce varied forms of interpersonal harm, including online harassment [6, 18, 44, 45], self-disclosure and privacy risks [38, 55], and interpersonal tensions between age groups (e.g., children and adults) [35, 36]. These works point out several challenges to defining, identifying, and mitigating interpersonal harm in social VR. Above all, experiences of harassment and other harms in social VR are extremely personal, and the same experiences can be interpreted differently by varying user groups [6, 18, 35, 36]. This subjectivity creates a lack of identifiable social norms or consensus understanding of which behaviors qualify as harmful in social VR, in turn limiting the efficacy of existing strategies for creating safer social VR spaces (e.g., community guidelines and moderation) [50]. Additionally, compared to other online contexts, the embodied and immersive nature of social VR platforms enables harm that are more experientially similar to offline harm, such as violations of physical and personal space [6] that often particularly target marginalized users (e.g., women) including virtual "groping" and the most recent "rape" in the metaverse [52, 53]. As such, it is unclear how traditional methods for mitigating harm in online environments (e.g., human-based and AI-based moderation) could be effective enough on their own for social VR spaces where harms are embodied and happening in real-time [50], leading to an urgent need for seeking more nuanced solutions to understand and address interpersonal harm in new online spaces such as social VR.

In recognition of these issues, this paper takes an alternative approach to understanding and designing solutions for harm in social VR through the lens of **consent**, which can broadly be defined as *behavior indicative of an internal willingness to engage in a particular act* [4, 42]. We are motivated to apply a consent lens in the social VR context for two reasons. First, recent CSCW and HCI works have utilized the concept of consent for explaining the occurrence of personal harm in other social technologies (e.g., online dating [66, 67] and social media apps [26]). They find that interpersonal harm can be viewed as *nonconsensual* experiences, i.e. *experiences that are unwanted and occur without the agreement of the behavior recipient/observer*. This definition positions the recipient/observer of a nonconsensual act as the sole determiner of what is harm. This perspective thus circumvents issues of the lack of consensus and social norms on what should be defined as harm in social VR, which are currently hindering efforts to address said harm [6, 18, 35, 36, 65]. Second, the conceptualization of consent is most often attributed to research work on offline sexual practices [26, 28, 43, 54]. Such an offline-world inspiration can be seen in prior works seeking to innovate designs for safe and equitable social computing systems via **consent mechanics** (i.e. *features/structures for giving and receiving agreement to specific experiences*) [28, 54, 66]. Indeed, the embodied, immersive, and offline-world-like nature of social VR and its associated reported harm [6, 52, 53] arguably necessitates approaching harm mitigation from an angle that is more reflective of offline-world understandings of harm (i.e., consent).

Yet, despite implicitly and explicitly referencing consent in their community guidelines [2, 40, 57], popular social VR platforms such as VRChat and Meta Horizon Worlds have yet to provide technical features reflective of consent mechanics. Additionally, while a small body of prior work has begun to explore how consent could be designed in social VR to mitigate harms [11, 65], little work to our knowledge has sought to approach the design of consent mechanics in social VR from the perspective of actual social VR users. Therefore, our work foregrounds the experiences and

perspectives of 39 social VR users who have diverse backgrounds to investigate the following research questions:

**RQ1: How do people conceptualize consent and consent practices in their social interactions in social VR?**

**RQ2: Grounded in these conceptualizations, how, if at all, have people already (re)purposed existing design features in social VR as consent mechanics in their social VR interactions?**

**RQ3: What are social VR users’ own expectations for future consent mechanics in social VR to prevent interpersonal harm, and what are social VR users’ design recommendations to meet these expectations?**

Our work, as one of the first empirical studies to explore users’ own views of consent practices and consent mechanics in social VR, makes three much-needed contributions to CSCW and HCI research on understanding and mitigating harm in social VR. First, our study uncovers how actual social VR users conceptualize consent in these novel, embodied online social spaces as *boundaries*, which refers to pre-established behaviors that require explicit agreement from a recipient or between two parties before happening, and the act of practicing consent as *boundary setting*. In doing so, our findings illuminate how conceptualizations of consent used in other social technologies (e.g., affirmative consent) [26, 54] may not be reflective of the understandings and perspectives of users of emerging online social spaces such as social VR. Second, grounded in these understandings, our study finds that users conceptualize harm in social VR as *unwanted boundary violation*, thus innovating how harm, a subjective and highly personal experience, can be better defined and approached in emerging social VR spaces. Finally, our work highlights how users, despite not being provided official formalized consent mechanics in any social VR platform, are already repurposing social VR structures to fit their consent needs anyways. To account for this lack of design, our work provides critical and much-needed insights on how social VR users expect future consent mechanics to be designed to strike a balance between protection and interaction. Thus, grounded in the perspectives and direct design recommendations of our participants, our work pioneers a proactive approach to envision the future of consent mechanics in social VR by providing three principles for the design of said mechanics to prevent interpersonal harm while balancing expectations for immersive and natural social interactions.

## 2 RELATED WORK

### 2.1 Computer-Mediated Consent to Online Social Interactions

To understand why consent stands to be a beneficial lens to understanding and designing for preventing interpersonal harm in social VR, it is first necessary to explore how consent has been explored in other online social contexts. Indeed, existing CSCW and HCI literature have investigated various types of consent, ranging from consent for large-scale collection and use of personal data [21, 27, 33] to *individual consent* [32]. As our work endeavors to understand interpersonal dynamics in social VR, rather than large-scale collection of personal data, in this paper we predominantly explore HCI research into *individual consent*, which focuses on how an individual directly gives and receives consent related to an interaction.

HCI work on individual consent often borrows from research on consent to sex [26, 28, 43, 54], as this interdisciplinary body of literature provides definitions for consent that are relatively consistent despite a lack of true consensus [5]. Indeed, literature across public health, law, and other fields agree that **consent is behavior indicative of an internal willingness to engage in a particular act** (see [42] for a review and [4] for a policy example). Grounded either explicitly or implicitly in this definition of consent, existing CSCW and HCI work has investigated computer-mediated

consent both (1) as a crucial lens to explain interpersonal harm in online social spaces, and (2) as a generative theory for preventative solutions to interpersonal harm in these spaces.

*2.1.1 Consent as a Crucial Lens to Explain Interpersonal Harm in Online Social Spaces.* As a crucial lens to conceptualizing interpersonal harm in the public health domain [4], consent has become similarly critical in computer-mediated communication [26, 66, 67]. Most notable is consent in relation to sexual violence, a globally endemic issue [7] that is now defined across domains as nonconsensual behavior of a sexual nature [4, 66, 67]. Key to this definition is that it sidesteps the need for a consensus list of behaviors that universally qualify as harmful, as the existence of communities dedicated to Bondage, Domination, Sadism, and Masochism (BDSM) show how the same actions can be perceived as hurtful by some and pleasurable by others [5]. Rather, a consent-based definition embraces the subjectivity of interpersonal activity, characterizing sexual violence (i.e., interpersonal harm) based purely on whether a behavior was wanted (consented to) by the recipient. Within computer-mediated communication, this lens of consent has been extended to reflections on sexting [24], the use of sex workers' photos for online advertising without their permission [3], and on framing massive online harassment and revenge porn through social media platforms [26].

Additionally, studying **consent practices** – *how people give and perceive to receive consent to particular acts, independent of the tools/features (i.e., mechanics) used to facilitate these practices* – has produced valuable insight within and beyond HCI/CSCW about why nonconsensual acts (i.e., interpersonal harm) occur in online and offline social spaces. Above all, research on sexual consent practices demonstrates how sexual violence often occurs without the realization of the perpetrator or victim due to “sexual scripts” [61] that challenge one’s perceived right to decline consent [10] and adoption of consent practices that are susceptible to misinterpretation (e.g., inferring agreement to sex through nonverbal cues) [25]. Similarly, HCI and CSCW studies on computer-mediated sexual scripts [31, 48] and sexual consent practices in online dating have shown that some users interpret content in dating app interfaces (e.g., physically revealing profile pictures) as implicit consent to sex, leading them to make sexual advances on dates without asking for permission [66, 67]. These studies make it clear, then, that understanding and explaining interpersonal harm in online social spaces must include investigating conceptualizations of consent *and* consent practices.

*2.1.2 Consent as Generative Theory for Preventative Solutions to Interpersonal Harm in Online Social Spaces.* Prior CSCW and HCI research has also adopted harm-mitigative models of sexual consent exchange as generative theory [26], or inspiration for designing **consent mechanics** (i.e., *features/structures for giving and receiving consent to specific experiences*) [43] for maintaining safe and equitable interactions through social technologies. The most popular of these consent models is *affirmative consent* [29, 63], which seeks to mitigate sexual harm by advocating that sexual partners must receive and continually confirm overt agreement to specific sexual acts. It is commonly promoted through slogans like “yes means yes” [23] and Planned Parenthood’s FRIES model [46] that distills key elements of affirmative consent into a catchy acronym: consent should be (F)reely given (R)eversible, accurately (I)nformed, (E)nthusiastically given, and (S)pecific to individual acts.

In CSCW and HCI research, *affirmative consent* has been used to speculate on the design of many social technologies to advocate for just and equitable “consentful technology” [28]. For example, Im and colleagues build on that work by proposing various affirmative consent-inspired design patterns for mobile social media applications, such as controlling the visibility of one’s profile (voluntary consent) and reversible settings for content feed curation (revertible consent) [26]. Strengers and colleagues also use the FRIES model to pose design concepts for consensual interactions with sex robots and conversational UIs [54]. They offer guidelines for consent mechanics in embodied

interactions through what they call the TEASE process: (T)raffic lights or ambient feedback to denote whether to stop or continue an interaction, structures to (E)stablish ongoing dialogue about consent, supporting an (A)ftercare phase in which one’s satisfaction with the (sexual) activity is discussed, (S)afewords for immediate withdrawal of consent, and (E)xplication of soft and hard limits on allowable behavior [54].

Despite this growing body of CSCW and HCI literature on consent mechanics, there is a conspicuous absence of user involvement in their design or assessment, especially considering the recent critiques of sexual consent apps for inadvertently restricting sexual agency to revoke consent [43, 47]. One exception is the involvement of women and LGBTQ+ stakeholders in the design of consent mechanics for dating apps [19, 66]. Even affirmative consent has been critiqued for being too burdensome and unrealistic, and affirmative consent practices remain unpopular amongst the public [22, 42, 63]. These concerns thus raise crucial questions about whether technologies built with this model are usable or helpful for actual users. As such, we are motivated to involve social VR users in the conceptualization and reflection of consent and *consent practices* and the design of future *consent mechanics* in social VR, which could provide a valuable foundation for harm-mitigative consent mechanics that users understand and want in social VR spaces.

## 2.2 Applying a Consent Lens to Understanding and Mitigating Interpersonal Harm in Social VR

While social VR employs many techniques pioneered in traditional multiplayer online games and 3D virtual worlds, it goes beyond these non-immersive, on-screen media to enable more nuanced online social interaction dynamics similar to those in the offline world. Such dynamics revolve around *embodied* (i.e., how one can experience a virtual body representation as one’s own body [51]) first-person interactions enabled through avatars with full-body tracking, avatar customization features, and a broader spectrum of verbal and non-verbal communication modes such as voice, gestures, proxemics, gaze, and facial expressions [16, 34, 37]. People utilize embodied interaction capabilities in social VR to engage in many experiences ranging from the mundane (e.g., everyday activities like cooking or falling asleep with someone else) to more complex endeavors (e.g., exploring one’s identities and developing intimate relationships) [1, 13–17, 30, 56]. While social VR offers many benefits to users, it unfortunately also facilitates severe harm [6, 18, 52, 53]. In this subsection, we unpack prior work that contextualizes harassment and other harms in social VR. We use this prior work to elucidate the merits of applying a consent lens to understanding and mitigating interpersonal harm in social VR.

**2.2.1 Understanding Harm in Social VR.** Despite the opportunities for more nuanced online social interactions, there is growing concern that social VR may also introduce interpersonal harm. Such harms include physicalized, embodied forms of online harassment as detailed in empirical research [6, 18], technical reports [44, 45], and mass media [52, 53]; concerns about self-disclosure and personal privacy [38, 55]; tensions between social VR users of different age groups [36]; safety risks for both youth and adult social VR users [35, 36, 64]; and challenges to present marginalized identities (e.g., queer and non-cisgender identities) in social VR [14, 17].

While the aforementioned work has made significant strides in understanding the occurrences of different types of interpersonal harm in social VR, there are barriers that prohibit this coalescing of harms from translating into actionable prevention strategies. Most critically, there is a distinct lack of consensus amongst users on what constitutes socially appropriate behaviors in social VR. For example, social VR users have been shown to have differing opinions on how they distinguish harassment from behavior that is just inappropriate or “fun/play” [6, 18]. This lack of consensus is driven by two factors: (1) experiencing harassment in social VR is subjective and extremely



personal, and what might feel harassing to one person might not feel harassing to another when it happens to them [6], and (2) social VR users' diverse desires for experiences create situations where behavior that might seem appropriate to one group of people is interpreted as inappropriate by a different group of people with different experiential desires. On (2), Maloney et al. revealed several tensions emerging in adult-to-children interactions in social VR [35, 36] as children consider their curiosity-driven behaviors adventurous and playful, while adult users tend to view such behaviors as immature, annoying, or even harassing [35, 36].

The diverse uses for social VR, and associated inconsistency in perceptions of harassment, complicate attempts to objectively define and regulate harm in social VR [18]. This concern arguably parallels issues with objectively defining sexual violence in light of the existence of BDSM communities as discussed in 2.1.1 [5]. Viewing interpersonal harm through the lens of consent, therefore, may help circumvent the need for a consensus on what universally qualifies as harm, which mitigates the paralyzing effects of this lack of consensus in social VR on seeking new strategies to prevent such harm.

*2.2.2 Existing Designs to Mitigate Harm in Social VR.* Unfortunately, efforts to mitigate harm in social VR are often insufficient, as existing formalized safety features predominately adopt a reactive approach, such as blocking, muting, or reporting a harasser after an incident has occurred and the damage has been done [18, 50]. Even more "proactive" features, such as "personal bubble" features in Meta's Horizon Worlds that put up a barrier to prevent people from getting close to a user [41], often undermine a users' immersive and embodied experiences in social VR because no one, including friends, can get close to a user once the bubble has been activated. Additionally, the embodied, immersive real-time nature of social VR makes the efficacy of common methods for addressing harm in online environments, such as human-based and AI-based moderation, questionable on their own [50]. Therefore, more research is urgently needed to explore nuanced ways to better protect people from potential interpersonal harm in social VR spaces, such as through new consent mechanics.

Currently, existing popular social VR platforms have not yet provided official, formalized technical features dedicated to computer-mediated consent mechanics for social VR interactions, despite many of them using some degree of consent-centered language in their official community guidelines to explain inappropriate/harassing behaviors within social VR. For example, VRChat defines harassing/inappropriate behavior by the intent of the perpetrator (e.g., "*intent to disturb or upset*") [57], while Meta Horizon Worlds uses language that focuses more on the (non)consensual nature of the interaction, although not in explicit "consent" terms (e.g., "*unwanted behavior*") [41]. Before its discontinuation in March 2023, AltspaceVR's policies did explicitly reference consent (e.g., "*two consenting adults may develop a relationship of a romantic or sexual nature*") [58], yet never provided users any specialized tools (i.e., consent mechanics) to facilitate the giving and receiving of consent in a systematic way. Efforts to recognize the power and necessity of consent, particularly within embodied intimate interactions (e.g., sexual situations in social VR), are undermined when users are not provided the tools they need to either *prove beyond subjective interpretation* that the act was harmful or prevent other users from having harmful interactions with them *before they happen*. Therefore, we urgently need to conceptualize and advocate for the future design of consent mechanics in social VR.

Perhaps recognizing this need, Cortese and Zeller proposed designs for affirmative consent in social VR pursuant to user safety [11]. In line with ongoing and reversible consent, they view gesture-based mechanics as "reactionary tools that allow all users [...] the basic tenets of consent" [11]. They also suggest that social VR applications should monitor "users' levels of active, affirmative interactions" to identify and intervene in potentially nonconsensual interactions [11]. While this

study provides valuable insights on approaching designs of consent mechanics in social VR, it was solely based on developers’ and designers’ own speculations and did not involve perspectives from actual social VR users. Relatedly, Zytka and Chan found that prospective users of VR dating applications desire consent mechanics for mitigating harm in VR interactions with potential romantic partners [65]. Yet, it is still unclear how actual, rather than prospective, social VR users understand consent and consent practices in existing social VR platforms, what design features they have already (re)purposed as consent mechanics in social VR, and to what degree they may react to or use new, deliberately designed consent mechanics in their future social interactions.

We thus are motivated to explore (1) how social VR users conceptualize consent and consent practices in their social interactions in social VR (**RQ1**); (2) existing design features people have already (re)purposed as consent mechanics in their social VR interactions (**RQ2**); and (3) social VR users’ own expectations for future consent mechanics in social VR to prevent interpersonal harm and how social VR design can meet such expectations (**RQ3**).

### 3 METHODS

**Recruitment and Participants.** This study was a part of a multi-year research project on social experiences in social VR. The University’s Institutional Review Board (IRB) approved this study for research ethics prior to the recruitment of participants. We posted recruitment messages on various popular online forums for social VR users (e.g., r/SocialVR, r/VRchat, r/OculusQuest, r/Recroom, and r/gaymers in Reddit) and social media platforms (e.g., Facebook and Twitter) to recruit participants engaged in various social VR platforms who are willing to be interviewed. We then interviewed all willing participants in March and April of 2022 (N=39).

We acknowledge that our recruitment methods may lead to potential self-selection bias (e.g., active social media users who are also social VR users). However, the individuals recruited through these methods provide unique insights into how social VR users understand and approach consent in their VR experiences, which are much needed for HCI and social VR research. The average age of our participants is 25.62 (excluding 2 N/A responses). The majority of our participants are users of VR Chat (N=23), AltspaceVR (N=12), Meta Horizon (N=5), and Rec Room (N=4). Additionally, Spatial, Decentraland, Immersed, Bigscreen, Mozilla Hub, and Spatio VR are used by less than three participants. On average, our participants have been engaging in social VR for 2 years and 7 months. Table 1 summarizes participants’ demographic information and social VR experiences.

**Interviews.** We conducted semi-structured in-depth interviews with the participants via text/voice chat over Discord or Zoom per the participants’ personal preference as one-on-one sessions to protect their identity and privacy. Prior to the interviews, we provided an informed consent document to all participants based on their communication preferences, such as via emails or Discord messages. We did not collect names or identifiable information from participants. Interview questions were crafted using dialogic techniques designed to encourage participants to engage deeply with their responses [59]. These questions drew inspiration from prior literature on computer-mediated consent mechanics [26, 43, 54, 66, 67] and social interaction dynamics in social VR [1, 13, 15, 16, 34] as well as from our own prior experiences with social VR as both researchers and users. Interviews lasted 102 minutes on average, and participants received a \$50 Amazon digital gift card after they completed the interviews.

Interviews began with introductions, basic demographic questions, and questions about their level of experience in social VR as well as experiences with, and potentially new strategies for mitigating, interpersonal harm in social VR. Next, and most relevant to this study, interview questions covered the potential for computer-mediated consent mechanics to prevent harm and facilitate interaction in social VR. We provided participants with a brief explanation of consent mechanics and consent practices: consent mechanics as *features/structures for giving and receiving*

consent to specific experiences and interactions in social VR; and consent practices as *the processes or steps that people engage in to give and perceive to receive consent, independent of the above-mentioned mechanics used to facilitate these processes or steps.* We purposely avoided scaffolding interviews with specific models and definitions of consent, such as affirmative consent, so as not to imply that there is a particular way that consent *should* be exchanged that may clash with participants’ own views and discourage participants from expressing such views.

Participants then reflected on how they currently understand consent in social VR and their current practices for consent exchange in social VR, including the existing design features that they (re)purpose for consent exchange. Such questions also explored their underlying beliefs around consent, such as the particular situations that they believe to require and not require consent exchange, and the perceived impact of consent practices on their prior social VR experiences. Other questions pursued a more speculative or design-focused direction, with the discussion of where new consent mechanics could be inserted in the social VR experience, how those consent mechanics

Table 1. Demographic information and social VR experiences of participants

ID	Gender	Age	Ethnicity	Sexuality	Location	Social VR Experience
P1	Woman	25	Black	Lesbian	USA	3 years
P2	Woman	25	Black	Lesbian	USA	8 years
P3	Woman	24	Black	Straight	USA	3 years
P4	Woman	24	Black	Lesbian	USA	6 years
P5	Trans Woman	26	White	N/A	USA	3 years
P6	Trans Woman	27	Biracial White and White/Indigenous Canadian	Asexual	Canada	6 months
P7	Non-binary/Agender	19	White	Pansexual	France	1 year
P8	Woman	25	Black	Lesbian	USA	5 years
P9	Man	20	White	Bisexual	Germany	1 year
P10	Genderqueer Feminine Presenting	N/A	Biracial White and Black	N/A	USA	3 years
P11	Trans Man	18	White	Queer	USA	1 year
P12	Woman	26	Black	Queer	USA	4 years
P13	Man	25	Black	Straight	USA	3 years
P14	Woman	20	Biracial Black and Italian	Asexual	USA	1 year
P15	Man	27	White	Gay	USA	3 years
P16	Man	25	Black	Straight	USA	2 years
P17	Man	18	White	Gay	USA	1.5 years
P18	Man	29	Mixed Race	N/A	USA	
P19	Woman	25	White	Pansexual	Germany	4 years
P20	Woman	24	Black	Bisexual	N/A	3 years
P21	Man	20	Black	Straight	USA	1.5 years
P22	Woman	27	Black	Lesbian	USA	3 years
P23	Woman	29	Black	Lesbian	USA	5 years
P24	Man	19	White	Gay/Bisexual/Pansexual	USA	6 months
P25	Man	N/A	Black	Straight	USA	2 years
P26	Man	25	Black	Straight	N/A	3 years
P27	Man	25	Black	Straight	USA	2 years
P28	Man	22	Hispanic	Bisexual	Guatemala	2 years
P29	Woman	31	Middle Eastern	Lesbian	USA	1 year
P30	Man	30	Mixed Race	Queer	USA	2 years
P31	Woman	44	White	Straight	USA	5 years
P32	Man	30	Hispanic	Bisexual	USA	3 years
P33	Man	25	Black	Straight	USA	3 years
P34	Man	21	White	Straight	USA	3 years
P35	Woman	40	Biracial Native and Hispanic	Lesbian	USA	4 months
P36	Woman	28	Native and White	Straight	USA	3 years
P37	Man	25	Asian	Mostly Straight	USA	3 years
P38	Woman	30	White	Asexual	USA	6 months
P39	Woman	25	Black	Straight	USA	2 years

**Note:** N/A – participants preferred not to answer.



should be designed to prevent harm and expectations about the use of future consent mechanics in social VR.

**Data Analysis.** After interviews were complete, recordings were first transcribed and organized within spreadsheets for clarity during data analysis. We then adopted the thematic analysis approach [8, 9] to conduct an in-depth inductive qualitative analysis of the collected data.

Following Braun and Clarke’s [9] detailed guidelines and reproducible procedures for thematic analysis, we analyzed all collected interview data in the following steps. (1) Familiarizing ourselves with the data: Two of the authors closely read through the participants’ transcribed narratives line by line to identify information relevant to the research questions by highlighting them and taking notes to gain a full picture of how social VR users think of consent practices and mechanics to protect them from harm and facilitate interaction in social VR [9]; (2) Generating initial codes: The same authors began an iterative coding process. They independently assigned preliminary codes to identified information. Then, the two authors combined the identified codes, eliminated redundant codes, and ensured that highlighted content only aligned with a single code; (3) Searching for themes: These authors categorized codes into thematic topics related to our research questions and developed sub-themes from participants’ descriptions of how they understand consent for social VR; (4) Reviewing themes: All authors continued to discuss, integrate, and refine themes and sub-themes to streamline social users’ ideas of consent for social VR to best capture and represent the data in relation to the research questions; (5) Defining and naming themes: All authors collaborated to further refine these themes and name the final set of themes. At this stage, all authors considered themes across the entire data set and identified the “essence” of what each theme is about [9]; and (6) Producing the report: All authors selected the most compelling quotes as examples and logically drafted the structure of the findings. The goal of this phase was to create a narrative structure where all findings flowed naturally and coherently [9].

## 4 FINDINGS

In this section, we first detail how our social VR users understand the notion of *consent* and what it means to *practice* consent in their social interactions within social VR, specifically through conceptualizing consent as “boundaries” (RQ1). Grounded within these conceptualizations, we explore the design features people have already (re)purposed as *consent mechanics* in their social VR interactions, particularly in social VR spaces that do not yet have formalized, official technical features for computer-mediated consent (RQ2). Finally, we explore social VR users’ expectations for designing future consent mechanics in social VR to prevent interpersonal harm as *boundary violations*, and how they envision various designs to meet these expectations (RQ3).

### 4.1 Conceptualizing Consent and Consent Practices in Social VR

First, we must explain how actual social VR users conceptualize the notion of “consent” in social VR, which would significantly affect how they approach and react to any future technology designs of consent mechanics. Intriguingly, participants collectively understand and define consent in social VR through the lens of *boundaries*. Consent practices, then, revolve around *negotiation of these boundaries* (i.e., boundary setting) in various ways as described by our participants.

**4.1.1 Boundaries as a Foundational Lens to Conceptualize Consent in Social VR.** Overall, our participants understand consent as a complicated term with heavy, and not always intuitive, implications. As P7 explains, “*Consent is a complicated subject in VR because not everyone has the same limits... it’s hard to communicate more complicated things.*” It makes sense, then, that the majority of our participants conceptualize consent through the lens of “*boundaries*”, a term often associated with the unique affordances for visual and literal boundaries in social VR that are not

present in the offline world or other comparable online contexts such as gaming and virtual worlds. Indeed, the term "boundary" aligns with pre-existing concepts in social VR, such as the social space bubble that creates a physical "boundary" around a user's avatar to prevent close contact (Figure 1). For example, P35 describes young adolescent users as toxic because they have "*no social boundaries, they just do whatever they want.*"

Our social VR user participants, then, define consent as **boundaries**, which refers to the delimitation of behaviors/interactions that require explicit agreement from a recipient or between two parties before happening (i.e., those that require consent) from those that do not. Thus, **experiences of interpersonal harm in social VR are conceptualized as violations of boundaries**. Our findings first focus on exploring three foundational facets of boundary violations: (1) violations of boundaries, and thus boundaries themselves, are often defined through individual perceptions of offline boundary violating behaviors/interactions; (2) boundaries and violations of boundaries are simultaneously defined and complicated by unspoken, ill-defined social VR norms; and (3) setting boundaries in an often physically and socially boundless social VR space does not always prevent violations of those boundaries.



Fig. 1. Space bubbles in Meta Horizon Worlds, which create four virtual feet between avatars [49].

For (1), our participants provide many definitions of what qualifies as a boundary violation, and indirectly define what behaviors/interactions are predetermined versus requiring consent. In some cases, these boundaries and violations are defined by individual participants by what they perceive as norms of acceptable behavior in equivalent offline-world scenarios. For example, P24 outlines,

"They will insert themselves into social groups that they're not a part of, act overly friendly [or] overtly sexual with people that they are not familiar with, they'll make people uncomfortable and oftentimes, they will act in a somewhat childish way when they are called out on their behavior, or someone simply says no to them, because they're not part of the friend group."

According to P24, boundary violations can occur when individuals act in ways that people may find jarring in offline-world social situations (e.g., a stranger acting overly friendly or sexual upon approaching a group of established friends). This behavior can even cross the line from uncomfortable to harassing, which can be especially harmful when the person violating a group's boundaries reacts negatively to being called out for their behavior.

In particular, crossing a boundary in a professional setting in social VR can be a more harmful behavior, and thus something classified as nonconsensual within a social VR interaction. For example, P2 shares,

"I told the client to shut up, and that was a total violation there [...] I think when it has to do with the real world and in person workspace setting, there's a level of respect

according to different persons and different personalities. When we actually have a workspace on VR, these to a large extent give some persons the boldness to actually say some words or settings that they wouldn't have actually said in the reality. "

P2 acknowledges that, even though she might have felt emboldened to speak out against her client because of the meeting's virtual nature, her actions still are a boundary violation the same as they would have been if the meeting was offline. P2's perception of this boundary violation in her offline world (i.e. failing to show an appropriate level of respect for a client) directly translates to a boundary violation in social VR because of the shared social context.

However, our participants also highlight that (2) boundaries and their violations are simultaneously defined and complicated by unspoken and ill-defined social VR norms. Given this perspective, our participants emphasize the urgent need to understand how consent practices function and can be improved in social VR to prevent interpersonal harm from nonconsensual experiences. P7 and P10 both highlight a common practice in VRChat – head patting (i.e., patting another users head via avatar-body synchronized movements) – that demonstrates this complication:

"There's a few things that are inherent to VRChat culture, like headpatting (petting another user's head) or booping (touching another user's nose), and while most people are happy to receive and give it, some may not be." (P7)

"There's this thing on VRChat as well, where people like to give head pats or something like that. I think that should always be asked for consent because people have done that to me, but if they're in really big avatars, it kind of freaks me out. So I would rather people ask before they just come up to me and do that." (P10)

Both participants acknowledge that some behaviors in VRChat are considered "*inherent*," as they are behaviors that "*most people are happy to receive and give*" (P7). As such, VRChat users in P10's experience appear to feel emboldened to "*just come up to me and do that*," based on the assumption that other VRChat users will be okay with the gesture. Both P7 and P10, however, acknowledge that navigating someone's personal boundaries is complicated even when behaviors are considered "acceptable" by others. In this sense, understanding boundaries and boundary violations in social VR is not a simple matter, as an action that might be perceived as acceptable at a macro-social scale (e.g., platform-wide) could be unacceptable at a micro-social scale (e.g., individual).

Finally, for (3), setting boundaries in immersive, open social VR spaces (i.e., physically boundless spaces) by many people at once (i.e., socially boundless) presents unique complications, due to mixed reactions from other users. P3 and P8 describe these complications,

"Some people, they'll be shocked, or they'll wonder about me because they'll think that maybe I was doubting them, or I'm failing to trust them." (P3)

"Most persons might actually not have the patience. Some persons might react negatively, and well, other persons might be okay with it. But it actually depends on the persons involved, and how they actually see the whole [issue] of consent." (P8)

P3 shows how social VR users expect other users to be open and accessible to them, and that setting boundaries is a violation of that open policy. Social VR's boundless experience also encompasses the real-time, offline-like nature of social interactions which often do not lend themselves to frequent interruptions, which could be why P8 is concerned that "*most persons might actually not have the patience*." P8 does point out, however, how a person reacts to another person setting their boundaries is likely determined by how they understand consent, necessitating further exploration of how that term is specifically interpreted by our social VR users in the next section.

**4.1.2 Consent Practices in Social VR Revolve Around the Negotiation of Boundaries.** In light of our participants' understandings of boundaries in their social VR interactions and the challenges

inherent in trying to set these boundaries, participants highlight three ways to practice consent in social VR related to the negotiation of boundaries (i.e., boundary setting). These three ways are not mutually exclusive, but rather represent the nuances involved in negotiating boundaries for oneself with or without another party to the boundary setting process, making this process one that fundamentally starts at the level of an individual and extends out to negotiations of boundaries with others.

First, some participants view consent practices in social VR as involving **(1) the gathering of information about an interaction partner to inform one's decision on whether to grant consent for further interaction**. Often these judgments focus on information that might give a user clues about their partner's intentions to violate their boundaries. For participants like P12, giving consent is an act that first requires one to have gathered enough information about the person seeking consent to judge the person's intentions, explaining, *"Before I pick you, I definitely should have seen some good features in you or something."* If they judge that the other user is likely to violate this consent, P2 explains that one can pre-determine not to accept their presence, *"I'm not going to go with this guy because I see some level of immaturity when it comes to the VR space."* For P2, determining whether or not one agrees to further the interaction level one has with another user like going and doing a different activity with them (i.e., *"go with this guy"*), depends on one's judgement of the other user's behavior up until that point, which can serve as an indication of why further interaction might not be desirable. There is, however, an inherent risk to relying on this pre-determination. For example, P29 believes that these judgments of intentions do not ensure that the person will not harass the user after consent is given, no matter how carefully the other person is evaluated.

Second, other participants view consent practices in social VR as **(2) asking permission and exchanging mutual permission, often in ways that mimic what an individual participant views as common consent practices in the offline world**. Participants like P27 and P35 understand consent processes in social VR as fundamentally rooted in how an individual user perceives consent practices in their offline worlds (e.g., *"some stranger wouldn't just walk up to your kid,"* P35) to inform when they need to seek consent before an interaction.

In addition to asking permission, several participants understand this offline-world parallel in the consent practice of mutual agreement. In other words, consent is not something that one person dictates, but rather two (or more) people decide the terms (i.e., boundaries) set for an interaction. These participants often use language reminiscent of offline-world mutual agreements (e.g., contracts) and of other online contexts such as gaming. On the former, when asked to explain how consent might work in social VR, P13 visualizes a system where users provide other users a written-out list of what their boundaries are that must be agreed upon before interaction can occur, *"When I read your content or when I get the content [consent form], if it's something I'm comfortable with, I will agree to it and other stuff."* P13 goes on to explain that, should the other user's consent form list conditions for interaction that P13 is *not* comfortable with, *"I will decline."* In other words, P13 views the act of practicing consent as one in which both parties of a potential interaction have to negotiate and mutually agree on the terms, or else either one is free to decline.

On the latter, P37 describes this mutual agreement in terms of other types of games and situations,

"There's the same thing that you said that was put into practice, but it's in an anime. In the story that they dive deep into saying, 'Yeah, this method is available in the game, but before you do it, the girl has to press, 'I agree,' to consent to do sexual acts with this person,' whatever. Then when you press okay in the anime, now the guy's able to do the action." (P37)

P20 even wishes to take consent practices a step further by making these mutual agreements have offline legal weight,

“I would prefer I give a consent form to the person to fill. You fill this consent form promising not to harass me, promise not to say anything abusing to me, promise not to play with my emotions and all of that. [...] It’s actually going to be like a PDF file. I’m actually going to be the person who’s actually going to type that, and then I send it to you as a document you sign. I’m going to keep spaces where you have to sign and put your name and all of that, put the date and everything. Then you get to send it back to me using my email. I get to assess it. And then I agree to continue with you.”

For P20, a contract explicitly codifies and expresses one’s unique boundaries preemptively in a way that requires effort, care, and negotiation (e.g., emailing, requesting to sign, and signing the contract). P20’s statement thus emphasizes consent practice as a mutual and official process that cements both parties’ agreements to an interaction after their negotiation based on the explicit, pre-existing boundaries.

Finally, playing off of P20’s views, consent practices in social VR are viewed by some participants as a way of **(3) pre-establishing boundaries before another party attempts to interact, either through conversational or less interaction-oriented means, to engender a sense of control over one’s bodily experiences**. Social VR as previously discussed is unique to other online social contexts (e.g., 2D social networking sites and traditional gaming) in part because of the way it leverages offline-online synchronization of body movements and 360-degree immersive visuals to cognitively collapse one’s physical and virtual body together. As such, consent practices act as a means of controlling who has access to one’s virtual/physical body and what they can or cannot do to said body. For example, P1 feels that *“It [consent] certainly is going to make me feel in charge of my own security.”* P19 further links this control to a tangible feeling of protection sharing, *“I feel more protected knowing I have full control even over my virtual body, I wouldn’t necessarily call it empowering, but it’s definitely more reassuring.”* This control as leveraged through consent practices provides the dual benefits of protection and reassurance for many participants, particularly when a user wishes to set their boundaries before another party interacts to avoid the potential discomforts of having to negotiate boundaries with another user.

## 4.2 Existing Consent Mechanics in Social VR Interactions

Earlier, we discussed how our participants conceptualize consent and consent practices in social VR largely in terms of boundaries. As such, how users put these conceptualizations into (re)purposing existing design features as *consent mechanics* in their social VR interactions becomes important. As we have noted previously, existing social VR platforms have not yet provided official, formalized technical features dedicated to computer-mediated consent mechanics for social VR interactions. However, in our study, we identify two consent mechanics that our participants already use by (re)purposing specific social VR features.

**4.2.1 Using Specific Virtual Locations as a Consent Mechanic through Spatial Boundaries.** In most social VR platforms, there is a mix of private spaces and public spaces that users can enter into to interact with other users. Private spaces can generally be understood as virtual spaces, worlds, or events within a platform that only authorized users can enter/join. Such spaces require social VR users to get approval from or be provided with an invitation to enter by the space creator, typically another social VR user as in VRChat [57] or an Event Host as in AltspaceVR [60]. In contrast, public spaces do not require prior authorization to enter, either because the environment itself is hosted by the social VR platform and thus open to everyone or the space creator allows access without prior authorization. In this sense, public worlds often present greater opportunities to encounter and

meet online strangers in social VR, while private worlds are often used for hosting more intimate meetings, activities, and events for friends and acquaintances in social VR.

Building upon social VR users' conceptualizations of consent through boundaries, we found that how people use consent mechanics in social VR is often bound to the virtual location (i.e., private or public) where their interactions occur (i.e., spatial boundaries). Interestingly, despite their differences, private and public spaces seem to each produce assumed and inherent consent mechanics respectively.

**Presence within private space boundaries as an assumed consent mechanic.** For private worlds in social VR, some participants view these as places where an individual presumably knows others, and those others already know their boundaries. Thus, within this specific spatial boundary, consent is often implied, rather than sought out or shared. P7 and P9 explain,

"Friends-only worlds are kinda like this, as it requires people who want to join to already be trusted by the person making the world [...] In a private world, however, your friends should either already know, or ask." (P7)

"[Consent is] not in events or private worlds, since the people in those worlds are known to each other, so there isn't really a reason to have it there." (P9)

For these participants, joining private worlds in social VR works as an assumed consent mechanic because "*your friends should either already know, or ask*" what you want from these social interactions within this particular spatial boundary. When everyone assumes they know one another in a private world, the obligation toward giving or asking for consent becomes obscured. In this sense, as long as users stay within this private space boundary, the assumed "*trust*" among members would ensure that they can experience their ideal personal boundaries, making other types of explicit consent mechanics theoretically unnecessary.

**Entering public space boundaries as an inherent consent mechanic.** In public worlds, some participants also consider consent to be inherent due to the public, or open, nature of these spaces. P7 describes,

"In VRChat's case, joining a public world might just mean that you consent to anything weird that might happen, unfortunately. If someone comes into a public world, they should expect people to talk and/or interact with them. However, if I want to talk about something that might make people uncomfortable, or is heavy, I will of course make sure to ask before doing it."

Participants like P7 highlight the cultural norms of public spaces that supersede expectations for consent, such as the expectations that users should agree to "*talk and/or interact*" with others by default within these spatial boundaries. Thus, desires around their personal boundaries may be viewed as needing to be compromised for the mainstream expectations for public space boundaries.

Still, some participants see the need for opportunities for other more explicit consent mechanics within these public space boundaries. As described above, P7 asserts that some users take greater caution with content that can make others "*uncomfortable*." P10 also adds,

"Whenever I go up to a group, I ask if I can hang out with them or something like that, or if they're looking for another member to go play something. It's just more of a polite thing. I noticed that on VRChat, especially, people would just go up to groups and try to interact with them, and that's just because that's how you would interact with them in the type of public space. That's just like the norm that was dealt with, but I usually ask, because it's awkward whenever they don't want you there."

P10 takes the initiative to always ask to join groups, noting that this is not the "*norm*" in public spaces, but that failing to do so feels "*awkward*" and impolite. As such, while the act of entering



public social VR spaces itself indicates an inherent consent mechanic, there is an impetus for exploring the specific consent mechanics needed to support users' diverse social activities and offering explicit boundary setting in these spaces regardless. From this perspective, our participants also describe that, beyond specific spatial boundaries, how they request and express "YES" and "NO" through existing social VR features acts as a consent mechanic to actively control their personal boundaries.

*4.2.2 How to Request and Express "YES" to Control Personal Boundaries through Existing Social VR Features.* Consent that elicits a clear "YES" is referred to in the consent literature as *affirmative consent* [26]. Likewise, our participants explain several ways for requesting and expressing their versions of affirmative consent ("YES") through existing social VR features to actively control their personal boundaries in social VR interactions.

**Sending/accepting official invitation notifications in social VR as "YES" to indicate agreement to interaction during boundary setting.** A primary consent mechanic for social VR users to express their agreement to an interaction as part of their boundary setting process (i.e., "YES" to potential social interactions) is accepting an official invitation through the social VR system. For instance, P11 expresses that they *"think that invitations to games are a form of consent in themselves."* P17 further elaborates on the nuance of this invitation feature in social VR sharing,

"When you're in a world with some of your friends, and it set them up, like invite only, if you're friends with that person you can request to join, but for that to work, you have to friend them first and that's really the only thing I can sort of think of that fits that criteria."

P17 feels that using social VR platforms' friending and invite-only features helps people achieve some form of affirmative consent. In particular, this mechanic comes with many intentional, voluntary efforts to warrant consent. For example, social VR users must *"friend them first"* before they can begin to send a *"request to join"* their world. As such, the act of formally sending and accepting an invitation is a legitimate way to indicate affirmative consent for further interactions.

**Verbally expressing "YES" to express agreement to interaction during boundary setting through ubiquitous voice chat in social VR.** Our participants highlight the use of ubiquitous voice to verbally and explicitly express affirmative consent in social VR (i.e., saying "YES" to express agreement to an interaction). P8 shares how one of her friends used voice to indicate whether she agreed to be involved in any social VR interactions, *"seeking her consent before having anything to do with her on the VR space. She has to actually give a yes to your consent because she's going to be involved."* P11 also further expresses the importance of verbal, affirmative consent in social VR,

"I think actually speaking your words on consent are the best option. The way I use consent within the game is when asking if someone wants to go do something. Overall, no one has issues with me asking if they want to go do xyz activity. They either politely decline, say they'll join later, or agree to go."

P11 believes that by capitalizing on the ubiquitous use of voice chat, social VR users gain a straightforward consent mechanic for interaction. However, this mechanic ignores the many users who do not use voice functions, limiting the applicability of this mechanic to only select users. For example, P6, a trans woman, does not use voice chat as it activates her gender dysphoria and expressed the need for non-verbal mechanics to pre-establish boundaries instead.

**Expressing "YES" to indicate agreement to interaction during boundary setting through the body and embodied gestures in social VR.** Leveraging social VR's focus on immersive and embodied experiences, our participants express that using bodily movements and gestures can be a natural consent mechanic for expressing agreement to an interaction as a part of boundary

setting. This consent mechanic can be as simple as using "*gestures like making a thumbs up or a thumbs down, or nodding yes or no*" (P7), or "*a wave*" (P12) to communicate their agreement to become involved in certain interactions. Given that social VR highlights the correspondence of one's physical body and virtual body in social interactions through fully or partially tracked avatars, taking advantage of the embodied nature of social VR creates a more realistic and intuitive mechanic to express "YES" in a virtual space (e.g., nodding in social VR requires nodding in the physical world). It also simplifies the process of consent. Rather than relying on other means of communication, such as typing out a response, one can simply nod their head for a natural body movement to express yes.

*4.2.3 How to Express "NO" to Control Personal Boundaries in Social VR in Nuanced Ways.* Our participants also leverage unique social VR features to express "NO" to control personal boundaries (i.e., decline to agree to interactions to protect oneself from boundary violations) as an equally important consent mechanic in their interactions to an affirmative "YES."

**Default trust ratings, avatar hiding, and personal bubbles in social VR as a "NO" signal to preemptively communicate one's lack of agreement to interactions to protect oneself from boundary violations.** First, participants reveal the default features that come equipped in most social VR platforms enable them to deny consent to certain interactions that they perceive to violate or have the potential to violate their boundaries (i.e., cause harm). In discussing the specific features offered in VRChat, especially for Oculus Quest users, P11 shares,

"By default, all user avatars are hidden, unless you're already friends with the user. In the settings, I believe you can also choose whether people are silenced / muted by default, too. I think it's a great moderation tool when people actually use it, as it prevents unwanted interactions (and headaches, in the case of screaming children, lol)."

In this case, VRChat ensures that users can automatically opt out of certain interactions, whether that be because "*all user avatars are hidden*" or "*people are silenced/muted by default*," setting the standard for consent at the "NO" threshold. Therefore, this feature acts as a consent mechanic to prevent a boundary violation (i.e., "*unwanted interactions*") from occurring before any interaction between two parties even takes place.

Similarly, P19 explains how people can leverage the existing safety system to prevent boundary violations as a consent mechanic to express "NO,"

"The safety system in there allows to be customized in such a way that everyone that isn't a friend is muted and their avatars hidden by default. The position and hand movements if they're in VR still get transmitted, so the person can then decide to unmute them or show their avatar."

While the previous participant, P11, discusses these tools as those that prevent "*headaches*," P19 highlights how these automatic safety settings, despite not being intentionally designed for consent, can still be used as an effective consent mechanic by users. For example, by enabling social VR users to customize their settings, they gain greater nuanced control over their experiences by setting who they want to trust and interact with (or not).

Other participants focus heavily on using existing social VR features to put physical space between them and others to deny consent, namely the social space bubble/function that creates a physical "boundary" around a user's avatar to prevent close contact (Figure 1). P30 and P24 both share that this mechanic allows people to signal "NO" to others by making others "*disappear*" before they can get close to them physically (i.e., violating a personal space boundary). By setting up this feature as a consent mechanic to express "NO" before potential interactions, as P30 indicates, there

is great potential to mitigate harms such as harassment by setting up physical personal boundaries and automatically preventing others from literally and figuratively "crossing" such boundaries.

Despite these benefits, our participants feel that these existing consent mechanics of "NO" come with drawbacks. P6 discusses,

"VRchat has a basic form of this in that you can pre-set who can do things like talk to you and have their avatar visible to you based on a "trust rating" that is built in to the platform, which is based on time played and if you've had reports against you, but can also be changed at will on a person by person basis. It's a default feature, so most people use it without realizing."

Although these "pre-set" mechanics provide guidance on how to interact with others, taking into account "time played and if you've had reports against you", these trust metrics are unstable and inconsistent, particularly as they can "be changed at will." P6 then continues to add that these existing features can increase the workload for those who engage with consent mechanics,

I think if you're in spaces typically only visited by regular players it has the potential, but a lot of spaces are filled with people in the lowest rating and instead just results in a lot of extra work [because you] end up having to manually show every person's avatar because by default it doesn't show at the starting trust level."

As P6 explains, these default features for controlling personal boundaries may work in standard situations or in public spaces. However, once social VR users enter more niche community spaces, those needing to grant consent face "a lot of extra work" because the default settings make it impossible to discern users and their avatars at the standard trust level. As such, social VR users often need to "manually show" each avatar. This requires them to expend much effort into denying or granting consent, making this mechanic unrealistic for many users in day-to-day social VR engagements. As a result, they may have to choose between clearly setting up their personal boundaries and their desired social VR experience, a tension that is difficult to maintain long-term.

**Expressing "NO" through the body and embodied gestures to communicate one's lack of agreement to interactions to protect oneself from boundary violations.** Similar to how they could leverage their body and embodied gestures to express "YES," our participants highlight how their embodied gestures naturally and intuitively communicate "NO" to communicate one's lack of agreement to interactions. For instance, P17 emphasizes the value of "being able to just like block or move away from people or mute them or simply just ask them to stop. Definitely leads to better experiences overall, and I know that's the same for a whole lot of other people." For P17 and other participants, the embodied nature of VR provides them with a nuanced mechanic to deny consent through simple body movements (e.g., moving away from people or asking people to stop). Much like an offline experience, social VR users can rely on verbal and nonverbal communication mechanics to express their displeasure, replicating natural means of saying "NO" without additional technical burden on them (e.g., opening an extra chat window and typing no).

### 4.3 Users' Vision for Designing Future Consent Mechanics in Social VR to Balance Their Protection and Interaction Expectations

As a whole, our participants have shown how they have used certain consent mechanics in their social VR interactions by creatively (re)purposing existing social VR features not originally designed for consent. However, they also reveal an urgent need for designing and developing future consent mechanics to truly capture the nuances of social VR interactions, as there is no official, formalized technical features dedicated to computer-mediated consent mechanics in social VR. Therefore, we must first discuss how our social VR participants balance between their expectations for protection against harmful behavior as boundary violation and their expectations for open and embodied

interaction in social VR (section 4.3.1). Second, we must envision future design directions to address this balancing of needs based on social VR users' own perspectives and reflections in hopes of seeking nuanced consent mechanics to prevent interpersonal harm in emerging online social spaces (section 4.3.2).

*4.3.1 Protection and Interaction Expectations for Designing and Implementing Future Consent Mechanics in Social VR.* Overall, our participants welcome the idea of designing and implementing formalized consent mechanics in social VR to help them better protect themselves from interpersonal harm. This enthusiasm comes with expectations for how mechanics should balance protection with the freedom to interact within social VR in fulfilling ways, including (1) expectations of maintaining immersion in social VR; and (2) expectations of a natural social experience while interacting with others in social VR.

**(1) Expectations of maintaining immersion while in social VR.** Participants consider formalized consent mechanics promising opportunities to mitigate interpersonal harm in their social VR interactions by setting up boundaries and adding additional layers of self-control and agency. However, they also expect a level of protection that does not interfere with their unique and fulfilling experience in social VR, particularly its 360-degree, offline-mirroring virtual environment that makes users feel immersed in the virtual world. P36 explains,

"If I had to constantly ask, or if someone wanted to give me a hug and I had to constantly disable it, that would definitely be really annoying because I dislike pop-up windows. I especially hate it when my notifications come up in my screen. I find them annoying. Having constant popups might be a bit of a drawback because one of the biggest things we love about VRChat is the immersion, that you actually feel like you're there sometimes. It might break the immersion. It's kind of hard because we don't want it to feel like a bird cage, we want it to feel like a guardrail."

P36 demonstrates how consent mechanics and their potential design *must* understand and accommodate for immersion, as it critically motivates why users initially want to engage in social VR. Indeed, P36's vision of a system that prioritizes protection over immersion would look like (i.e., requiring frequent consent processes) feels unfulfilling, forcing them to frequently withdraw from or pause their immersive experiences for the consent process. As such, social VR users expect consent mechanics to give users the ability to maintain their own boundaries ("*a guardrail*") rather than feeling confined by the consent process ("*a birdcage*").

In fact, failing to meet this expectation would frustrate users, as P14 shares, "*If I keep getting notifications if someone wants to shake my hand, or they want to hug my avatar, I'm going to lose it.*" Given this intense frustration, social VR users like P14 would likely forgo consent mechanics altogether if their use interferes significantly with their expectations of immersion. Thus, balancing protection with immersion is a critical consideration when designing for future consent mechanics.

**(2) Expectations of a natural social experience while interacting with others in social VR.** As social VR focuses on offering embodied and realistic social experiences similar to offline interactions, many participants share the common expectation that the protection provided by consent mechanics must not "*take away the nature of the social space social VR is supposed to be*" (P34). P32 elaborates on this expectation,

"The spontaneity and the unpredictability you have in any real world is one of the things that makes life very interesting. [...] You don't decide who you see. You don't know who comes out of the house that day. You don't decide if anyone you see on the road might say hi to you or try to start a conversation with you. Even if you agree to reply or not, you don't decide if they start a conversation with you. I think that is

taking away with that concept on the VR world, where you decide who can interact with you. So it's a limited experience. It's created about more predictability and in a way, it'll become boring."

P32 defines the naturalness of an interaction in social VR by the level of spontaneity and unpredictability within interactions, as he feels these factors contribute to the sense that social VR mirrors the *"real world."* In this sense, a consent mechanic system that fails to meet the expectations of offline-world-like interactions by, in P32's case, limiting the spontaneity of interactions would make social interactions too *"predictable"* and *"boring"* for some users .

Other participants like P28 echo this expectation for more natural social experiences, although not necessarily in terms of spontaneity: *"You don't really do that [formalized consent] in a real-life interaction. If someone approaches you, you don't pull out a contract and be like, 'Okay, sign this before.'"* Here the naturalness of the social VR interaction is dictated by the individual user's offline-world expectations for social interactions. As such, taken in combination, P32 and P28's insights underscore the expectation that consent mechanics should not sacrifice the natural feel of social VR interactions that make these spaces unique for the sake of protection.

**4.3.2 Users' Recommendations to Address Expectations for Designing and Implementing Future Consent Mechanics in Social VR.** Acknowledging the aforementioned expectations for designing and implementing future consent mechanics in social VR to prevent interpersonal harm (i.e., boundary violation), our participants overwhelmingly state that any future formalized consent mechanics embedded into a social VR environment should allow users to pre-set dynamic and customizable boundary settings to mitigate intrusion and manage risks. More critically, even a pre-set system would need to be dynamic and customizable in recognition of how the ways in which social VR users determine and negotiate their own boundaries varies. P7 explains, *"I think giving the user total customization is the best. You should be able to switch something like 'hug' between 'always yes', 'ask for consent', and 'always no', depending on every type of user."*

Participants identified four specific factors to consider when designing customization options in future consent mechanics for social VR spaces: the relationship to the requester, the nature of the requested action, when and where an interaction takes place, and the ability to revoke consent. The first three factors address expectations of *immersion* and *naturalness*, while the last factor, that of the ability to revoke consent, adds an essential component to the future design of social VR consent mechanics.

**Relationship to Requester.** First, the majority of our participants believe that future formalized social VR consent mechanics should allow users to pre-set their preferences based on the relationship between the consent giver and requester. P7 and P19 envision,

"I would always say no to hugs from strangers, need consent for friends, and always yes for a partner." (P7)

"You can let certain people have no restrictions, while other friends might need to request beforehand." (P19)

P7's example demonstrates how future consent mechanics in social VR could be dynamically adjusted based on the relationship a user has with the requester. Meanwhile, P19's vision breaks these dynamic mechanics down even further by their closeness to any one friend. Indeed, our participants highlighted several advantages to designing consent mechanics in this dynamic way. Such mechanics would allow for greater protection against boundary violations from unwanted individuals (e.g., strangers hugging without permission) while also allowing users to engage in consensual interactions unobtrusively with trusted individuals (e.g., friends and partners), addressing expectations for both *immersion* and *naturalness* while also offering protection.

**Nature of Requested Action.** Second, while some participants like P3 and P5 indicate that every type of action request (e.g., talking or touching) within social VR should require consent, many more of our participants believe this would violate their expectations by interrupting a user's social VR experience frequently, thereby breaking *immersion* expectation and not being reflective of offline-world interactions where certain behaviors (e.g., saying hi) might not typically require consent, breaking *naturalness* expectation.

Most participants indicate that future consent mechanics in social VR should be designed to allow users to dynamically set their own boundaries rather than enforcing a standardized conceptualization of boundaries, as setting boundaries (i.e., determining what requires consent) is often a reflection of individual personal views and cannot be designed in a one-size-fits-all manner. P19 explains, "*Maybe once they add them as friends some things are then allowed by default, things like hugs or gifts, but kisses might still need a request for consent.*" P19's statement indicates that users have specific ideas of what kinds of interactions would need consent in social VR, and that assessment often appears to be tied to an individual's boundaries concerning their preferred level of physical intimacy.

Participants like P11 and P13 also describe their views on how physical intimacy influences what they believe requires consent in social VR, and why mechanic specificity is important to some users,

"I think the only situation in VR that would need consent would be sexual ones or ERP (erotic role play) [...] consent between adults is always necessary for sexual situations, so I think it's very important to have clear consent at the beginning of an interaction."  
(P11)

"Maybe the consent should be specific. For example, consent to get to do stuffs that are more intimate or do stuffs that have to do with privacy and other stuff. So I think that's where the content will come in. So it doesn't have to be the whole system having to have consent to talk, consent to do this, consent to do that, should be specific stuff that we can perceive will be dangerous, detrimental to users." (P13)

As discussed throughout this paper, social VR's embodied and immersive nature creates a sense that one's virtual body is tied closely to one's physical body, leading to especially disturbing experiences when one's virtual body is touched without consent [6, 44, 45]. Therefore, all participants seem to agree that sexual acts, including Erotic Role Play (ERP), would require explicit consent processes and mechanics to prevent boundary violations. Without these boundary setting processes and consent mechanics, social VR users are made vulnerable to embodied sexual boundary violations, thereby incurring significant harm and damage considered "*dangerous, detrimental to users*" (P13).

Having this level of specificity becomes crucial as new embodied physical features are incorporated into social VR under the premise of enhancing the embodied experiences of users. P14 describes a feature called "physics bones" not yet implemented into VRChat at the time of the interview (March 2021),

"There's a new feature coming in VRChat that I'm extremely excited about called physics bones. First of all, your avatar will have more dynamic bones than it can, actually. Let's say your hair will sway. Let's say your skirt will move in the wind and stuff like that. Or if you want to jiggle physics on your boobs. So you can have all that. And then people can interact with those things. Now, what they're going to do is they're going to make it so that certain people can interact with your physics bones."

P14 describes "physics bones" as a feature that will allow users to interact with others in more intimate, embodied ways because of the way it enhances the offline-style realistic nature of a user's



virtual body. While such a feature will likely enhance the experience of some users in social VR by contributing to the *naturalness* expectation of their interactions, it will also present risks for other users who do not desire that level of naturalness. For instance, with this feature, individual body parts could now be touched and manipulated in new ways that may cause more damage because of the realistic nature of the virtual body. As such, regardless of how each individual user chooses to define and set boundaries for what actions require consent, all users must be given a wide range of choices to accommodate the wide variety of potential boundaries and expectations for *immersion* and *naturalness*.

**When and Where an Interaction Takes Place.** Third, our participants also recognize that the *who* (i.e. relationship to the requester) and *what* (i.e., nature of requested action) of understanding boundary setting preferences is often dynamically affected by the *when and where* of an interaction. Consent mechanics, according to our participants, should be designed to allow users to dynamically change when and where their boundary settings should be applied. P35 believes,

*"And strangely enough, the only case it would make sense is in environments where you're not expected to actually walk up to people and talk. [...] I think unless it was like they were giving a talk and they had 500 people who wanted to talk to them."*

P35's vision of future consent mechanics in social VR adds onto existing Host moderation tools for AltspaceVR specifically, where event Hosts perform certain actions to manage crowds during specific events to prevent people from harming each other. Importantly, these types of events in social VR are designed to mimic offline events (e.g., in-person conferences with a speaker and crowd) where having restrictions on attendees' abilities to violate the speaker's boundaries feels *natural* to the social situation in question.

Additionally, regardless of whether users are in public or private spaces (i.e., the *where*), some participants like P5 believe that the expectations for consent mechanics matter most when the individual is choosing to interact with others, and when their actions affect others: *"Well, when you feel [like] being more involved. When you feel your activities [are] affecting others."* As such, the need for future formalized consent mechanics in social VR fundamentally relies on a user *wanting* to interact with other users, where pre-existing social VR safety features such as the space bubble become less desirable as a protection mechanic because they limit consensual and desired interactions. Given this, future consent mechanics should, according to our participants, provide a tool for social VR users *when they want to use it* that not only mitigates harms brought about by other existing safety features that do not meet immersion and naturalness expectations, but also protects *other users from their own actions, unintentional or otherwise*.

**Ability to Revoke Consent.** Lastly, many participants recognized an inherent dilemma that exists in any consent process: while granting consent implies a level of trust that the other party will not violate your boundaries, the consent process, and related consent mechanics, do not actually *guarantee* that the user will not be harmed once consent is given. Indeed, as P15 explains,

*"Because once you give consent to maybe a particular user, at that point you've given him your permission to maybe do whatever he likes, maybe harass you or something. It all depends. We have to be very careful with who we are giving consent, so not just anybody that comes our way."*

Even if social VR users are *"very careful"* with consent, many of our participants still recognize that their trust can be violated and *"even friends can harass you"* (P39). P4 further explains how this can happen and what needs to be done,

*"So whatever is happening between us, since I gave my consent, the person might try to be friendly and use friendly terms [...] I could enjoy it because I consented to it. But there should also be a report button if the person gave me consent and during the chat*

is becoming trying to harass, if that button could report and the person should be sent out and suspended for a period of time."

For P4, the nature of consent comes down to consenting to specific types of interactions, such as talking and chatting. As long as the interaction stays within that already-agreed upon range, she can enjoy it. However, if the other user violates the terms of consent to harass, then the interaction is no longer consensual and must be stopped. The majority of our participants believe that the ability to immediately revoke consent is vital to the success of future formalized social VR consent mechanics, and that action should remove the offending party from the user's vicinity to prevent an escalation of harm (e.g., *"if that button could report and the person should be sent out and suspended for a period of time"*). In this sense, the consent mechanics become dynamic as they are responsive to changes in the situation and user, allowing social VR users to change their minds about consent that leverages familiar social VR features such as reporting.

## 5 DISCUSSION

In addressing our research questions, Table 2 summarizes our key findings. Building from these, we first discuss how our findings extend existing CSCW and HCI literature on understanding and mitigating harm in social VR through the lens of computer-mediated consent, which especially highlights the importance of boundaries to conceptualizing and preventing interpersonal harm in social VR. We then identify implications for rethinking social VR design to create and implement future consent mechanics that prevent interpersonal harm as boundary violation while meeting users' interaction needs in the future metaverse.

### 5.1 Computer-Mediated Consent as a New Approach to Defining and Preventing Interpersonal Harm in Social VR Through Boundaries

One of the most pressing issues facing social VR researchers and practitioners alike is how to prevent and mitigate interpersonal harm such as harassment in social VR. These efforts, though, are often significantly inhibited by a lack of consensus over what behaviors qualify as harm compared to behaviors that are just inappropriate or "fun/play" [6, 18]. Users may view harm differently in these virtual spaces, complicating attempts to construct community norms around acceptable behavior and implement associated solutions to harm, such as community guidelines and moderation.

Drawing inspiration from the growing trend in CSCW and HCI towards understanding harm in online social spaces through computer-mediated consent and associated mechanics [26, 43, 54, 66, 67], our study represents the first of its kind to our knowledge to advocate for circumventing the need for consensus and social norming in social VR for defining and preventing interpersonal harm by focusing on conceptualizing and designing for consent in social VR. Prior work utilizing this lens in other online social spaces (e.g., online dating apps [66, 67]) illuminate how interpersonal harm can be viewed in ways that foreground an individual's experience of an action rather than the nature of the action itself when a consent lens is used [5, 42], inspiring our work to view consent as a promising lens to bypass the need for consensus and universal social norming.

In particular, one of the most important highlights from our findings is (re)conceptualizing of **consent to interpersonal behavior** in emerging online social spaces through the lens of **boundaries**, interpersonal harms as **boundary violations**, and the process of negotiation between oneself and between two parties on what is and is not a boundary violation as **boundary setting**. These (re)conceptualizations as boundaries thus represent a nuanced departure in terminology from other prior works on computer-mediated consent and is likely a reflection of the inherently spatial experience of VR [62] and the literal boundary affordances social VR platforms provide to

Table 2. Summary of key findings

RQs	Key Findings	Examples
RQ1	<ul style="list-style-type: none"> <li>Boundaries as a foundational lens to conceptualize consent in social VR</li> <li>Consent practices in social VR revolve around the negotiation of boundaries for oneself with or without another party to the boundary setting process</li> </ul>	<ul style="list-style-type: none"> <li>Boundaries and violations of boundaries are defined through individual perceptions of offline-world boundary violating behaviors/interactions; (2) Boundaries and violations of boundaries are simultaneously defined and complicated by unspoken, ill-defined social VR norms; (3) Setting boundaries in an often boundless - physically and socially - social VR space creates unique complications.</li> <li>Gathering information about an interaction partner to inform decisions on giving consent;</li> <li>Asking permission and exchanging mutual permission, often in ways that mimic what participants see as common consent practices amongst strangers in the offline world;</li> <li>Pre-establishing boundaries before another party attempts to interact to offer control over one’s bodily experiences in social VR.</li> </ul>
RQ2	<ul style="list-style-type: none"> <li>Using specific virtual locations as a consent mechanic through space boundaries</li> <li>Requesting and expressing “YES” to control personal boundaries through existing Social VR features.</li> <li>Expressing “NO” to control personal boundaries in social VR in nuanced ways</li> </ul>	<ul style="list-style-type: none"> <li>Presence within private space boundaries as an assumed consent mechanic;</li> <li>Entering public space boundaries as an inherent consent mechanic.</li> <li>Sending/accepting official invitation notifications in social VR as “YES” to indicate agreement to interaction during boundary setting;</li> <li>Verbally expressing “YES” to indicate agreement to interaction during boundary setting through ubiquitous voice chat in social VR;</li> <li>Expressing “YES” to indicate agreement to interaction during boundary setting through the body and embodied gestures in social VR.</li> <li>Default trust ratings, avatar hiding, and personal bubbles in social VR as a “NO” signal to preemptively communicate one’s lack of agreement to interactions to protect oneself from boundary violations;</li> <li>Expressing “NO” through the body and embodied gestures to communicate one’s lack of agreement to interactions to protect oneself from boundary violations.</li> </ul>
RQ3	<ul style="list-style-type: none"> <li>Users’ expectations for designing and implementing future consent mechanics in social VR</li> <li>Users’ recommendations to address expectations for designing and implementing future consent mechanics in social VR</li> </ul>	<ul style="list-style-type: none"> <li>Expectations of maintaining immersion during the time in social VR;</li> <li>Expectations of a natural social experience while interacting with others in social VR</li> <li>Be able to pre-set their preferences based on the relationship between the consent giver and requester;</li> <li>Be able to dynamically set their own boundaries rather than enforcing a standardized conceptualization of boundaries;</li> <li>Be able to dynamically change when and where their boundary settings should be applied, especially in light of users’ different expectations for immersion and naturalness;</li> <li>Be able to have the ability to immediately revoke consent to remove the offending party from the user’s vicinity to prevent an escalation of harm.</li> </ul>

users (e.g., personal space bubbles that create a physical “boundary” around a user’s avatar seen in Figure 1 [41]).

Indeed, prior CSCW and HCI works on computer-mediated consent often adopt an affirmative consent definition [26, 28, 54], which views consent as an ongoing and active process of affirming agreement to a specific act [29] and draws inspiration from psychology and offline-world conceptions of sexual violence (e.g., Planned Parenthood’s FRIES model [46]) [23, 43, 63], including Strenger’s application of the TEASE process to interactions with sex robots and conversational UIs [54]. Although these prior works provide valuable insights, they apply concepts of affirmative consent to the design of technologies with limited consideration for how *actual users* of said technologies understand and practice consent, which is particularly concerning given how affirmative consent practices are often critiqued for being too burdensome and unrealistic for widespread public adoption [22, 42, 63].

In contrast, our study deliberately seeks to construct understandings of consent and consent mechanics starting from the perspectives of actual social VR users, and in doing so found numerous ways in which these (re)conceptualizations converge and diverge with prior consent work with particular impacts on understanding harm in social VR.

First, our participants’ (re)conceptualizations of consent practices as boundary setting give insights into how elements of affirmative consent - namely principles of being specific (S in FRIES

[26, 28, 46, 54]) and voluntary [26] (or Freely given in FRIES [26, 28, 46, 54]) - are demonstrated in our participants' views. For example, prospective boundary-setting to particular interactions based on a variety of criteria (e.g., one's relationship to the consent requester) as detailed in 4.3.1 enables one to be extremely *specific* in what they are consenting to while also being deliberate and thus *voluntary* to the boundary-setting negotiation process with oneself.

Second, boundaries in social VR are conceptually and literally tied to the uniquely embodied and immersive social environments of these spaces, creating complications that established concepts like affirmative consent cannot account for. For example, some participants in our study explained that the act of simply being in a public space in social VR grants a form of implicit consent to whatever happens to an individual (4.2.1), a sentiment that is more reflective of conceptions of implicit consent that can often perpetuate interpersonal harm [25, 66, 67] and is in direct violation of affirmative consent's commitment to *overt* agreement to specific acts [29, 63].

Our study thus sheds light on how designing for safer emerging online social spaces such as social VR **must necessarily begin** with the perceptions of actual users of said technologies rather than pre-established theories and models of consent, as the latter technique may inadvertently contradict the lived experiences of users. In this sense, by first illuminating how social VR users understand consent as boundaries and harm as violations of boundaries, and how they negotiate their boundaries with themselves and with others, we are able to highlight the importance of leveraging consent mechanics as a nuanced alternative approach to design safer social VR spaces. We believe that this new approach has potential to circumvent the need to have a consensus on what constitutes harm, which may also go beyond existing harm prevention techniques such as community guidelines and moderation [6, 18, 50].

## 5.2 Leveraging Consent Mechanics to Design Safer Social VR Spaces

As previously discussed, much of the CSCW and HCI literature concerning the design of consent mechanics tends to do so without the express consultation of users, leaving the practical use and effectiveness of recommended designs unknown [26, 43, 54]. Most relevant to our study is Cortese and Zeller's 2020 [11] proposal for affirmative consent in social VR and Zytko and Chan's 2023 [65] participatory design of consent mechanics in VR dating environments. However, involvement of actual users with personal experience with consent practices in social VR was relatively limited in these works: Cortese and Zeller proposed design concepts from researchers' perspectives whereas Zytko and Chan's work did not require their participants to have prior social VR experiences.

In fact, insights from our social VR user participants partially contradict the consent mechanics proposed in these prior works. For example, a proactive monitoring system that identifies and intervenes in what it perceives to be "nonconsensual" interactions, as posed in both aforementioned works [11, 65], would also strip users of their control over their own bodily and emotional experiences—a consequence that our participants were not willing to accept. However, this is not to say that Cortese and Zeller's [11] and Zytko and Chan's [65] works are now moot. Their idea of using gesture-based consent mechanics to accommodate the uniquely embodied ways social VR users engage in interactions, as well as re-conceptualizing personal space bubbles as a consent mechanic, are still valuable. Instead, we hope our study and its implications for consent mechanics design acts as an example of how research must explicitly seek out and report users' own understandings of and visions for a safer social VR.

Based on our participants' own explicit design recommendations and our reflections as HCI and social VR researchers, we propose the following three design principles grounded in our participants' experiences in social VR and their visions for designing consent mechanics for future use to create safer social VR spaces.

*5.2.1 Principle 1: Borrowing In-World Manifestation Design from Pre-Existing, User-Identified Proxy Consent Mechanics.* One critical insight from our users is they expect future consent mechanics to be designed so that they balance their need for immersive and natural social experiences in social VR with their needs to feel protected. At the same time, they also reveal various ways social VR users are already practicing their own version of consent through boundary setting, such as using pre-existing social VR features such as proxy or makeshift consent mechanics (e.g., space bubbles [Figure 1]) and hand-raising and hand gestures to indicate and ask for consent as described in 4.2.

As our findings show, the acceptance of a new consent mechanic system in social VR can be significantly hindered by a disruptive change to the current immersive and real-time social interaction dynamics within these spaces. This points toward the need for a fundamental design principle for consent mechanics in social VR that resembles already-familiar features being utilized by social VR users to set their boundaries. Additionally, part of maintaining this immersive and natural real-time social environment comes down to the speed and ease with which users can operate the consent mechanism features. While there are many ways this design principle could be implemented, our participants detailed one example with a pop-up system in which a requester clicks the profile of the person they wish to interact with and seek consent from, the receiver gets a pop-up bubble in front of their visual field immediately, and finally, the user rapidly responds to that pop-up to determine the action. This example demonstrates how important it is to capitalize on existing structures that make providing consent simple and straightforward for users in social VR.

*5.2.2 Principle 2: Dynamic, Pre-Programmable Consent Mechanics for Customization at the Individual and Community Level.* Our findings also reveal that social VR users identify dynamic and customizable consent features as another fundamental design principle. In their vision, participants anticipate a system that would allow them to pre-program consent boundary-setting based on their relationship to the requester, the nature of the requested action, and when and where an interaction takes place. This customizable consent mechanic system would provide several advantages, including granting individual users literal control over their own bodily and emotional boundaries with one central system. This also ensures that boundaries can be managed automatically (e.g., requests from anyone who is not of "Friend" status could be automatically rejected), minimizing the intrusiveness and burden of practicing consent.

Pre-programmable and customizable consent mechanics should also extend to communities, specifically within user-created worlds where the same users frequently interact, as is popular in most major social VR platforms (e.g., VRChat and Horizon Worlds). The option for world user-creators and Hosts, along with community members, to pre-program community-wide and agreed-upon boundary setting practices would help prevent unwanted acts without hindering the "naturalness" of interactions. Users must also be allowed to change these settings at any point in time, and have the option to not have the system proactively act for them.

Furthermore, consent mechanic systems should provide a dynamic array of options to the user after another user sends them a consent request (e.g., "No", "Yes", "Not Right Now", etc.), one of which should give the user sufficient time to make their consent decisions while simultaneously communicating to the requester that they have not been outright rejected by the user (e.g., "Give Me time to Decide"). Some of our participants even suggested ways that users could preemptively let other users know that they do not want to be interacted with at the moment (conveyance of one's pre-programmed consent settings to others), such as by having a profile status that says "Not Taking Consent Requests At This Time." Finally, these should also include options that allow users to set up a dialogue with another user to negotiate boundaries (e.g., "Send User Message to

Negotiate"), as even the best customizable system cannot account for all the nuances of boundaries and boundary setting.

*5.2.3 Principle 3: Supporting Users After the Initial Decision to Give Consent.* Finally, our findings indicate that social VR users recognize that revoking consent is just as important, if not more so, than the initial giving of consent. The right to revoke or reverse consent after it is initially given is a foundational component of many models for consent, including Planned Parenthood's FRIES model (R for Reversible) [46] and Strengers et al.'s [54] TEASE process (S for Safewords for immediate withdrawal of consent). As such, part of our third fundamental principle for designing consent mechanics for safer experiences in social VR is the mandatory inclusion of affordances to facilitate the ability to revoke consent at any point during an interaction. This feature could be incorporated in social VR in several ways while still maintaining immersive and natural experiences. For example, the pre-programmable feature for interaction type could automatically stop an escalation of actions by requiring another user to ask for consent before they can move to the next interaction "level" (e.g., from hugging to kissing). Additionally, social VR users can pre-set a consent revocation action, such as a particular avatar movement or verbal safeword, that would automatically stop an interaction or reduce a partner's interaction capabilities.

A context identified by all participants as one in which consent revocation would be especially important is virtual sexual acts, including but not limited to Erotic Role Play (ERP), because of the severe damage that can stem from nonconsensual sexual experiences (sexual assault). It appears, then, that users who wish to engage in embodied sexual acts might require a unique consent mechanic system that prioritizes protection over fluid interaction to keep them safe. We take inspiration for a more protective consent system from the TEASE model developed by Strengers and colleagues for understanding consent in embodied interactions [54]. At a high level, this model puts special emphasis on the stages after consent that have been initially exchanged to interaction, particularly: maintaining awareness of in-the-moment feedback and revocations of consent through visual cues and safewords, and providing a space for post-interaction discussions about the experience with one's partner (a practice called "aftercare").

In terms of how the fundamentals of TEASE would be implemented in social VR for users who choose to engage in embodied sexual acts, exact manifestations of this were not explored by our participants and thus should not be extrapolated to avoid making assumptions about social VR users' perceptions. Nonetheless, we may suggest some potential implementations. Decisions to revoke consent, such as through pre-set avatar motions or safewords, could be conveyed to one's partner through pop-ups or visuals (e.g., a stop sign) so that one's partner realizes the revocation of consent and can deescalate the interaction or shift directly into "aftercare" to openly discuss why their actions prompted consent revocation.

Our participants identified one final component of this third principle: that of documentation, or reporting a user if they violate boundaries after giving consent. As discussed previously, major social VR platforms such as VRChat and Meta Horizon Worlds currently only talk about consent in vague terms within their community guidelines, if at all [41, 57]. AltspaceVR (discontinued March 2023), meanwhile, does explicitly discuss consent in their community guidelines, particularly in terms of sexual activity [58]. However, even in AltspaceVR, there is a failure to explain how to know if an interaction in social VR is not consensual and what types of evidence can be used to make such a determination, in turn creating a situation in which victims of nonconsensual acts have ambiguous access to recourse. As such, we strongly advocate for social VR companies to first seek to understand how their specific user base views consent and boundary setting, and then to design future consent mechanics in social VR in ways that allow for documentation of evidence in the event of nonconsensual interaction after consent revocation.



### 5.3 Limitations and Future Work

While our work contributes important findings for understanding and designing solutions for harm in social VR, we also acknowledge that our approach has limitations. For one, our recruitment methods (i.e., using active social media users who are also active on social VR) may lead to self-selection bias. Additionally, while our participants represent a large user base in social VR, there is overwhelming representation from U.S. (N=32) and those identifying as Cisgender (N=33), and all participants are adults (18+ years old). Therefore, increasing the international presence of participants can elucidate a more nuanced understanding of consent while also capturing what aspects of one’s offline culture coalesces with and juxtaposes social VR cultural norms around consent. Given our focus on defining and preventing harm and harassment in social VR, exploring more deeply into the perspectives of marginalized communities in future work can also help to unpack what consent practices and mechanics align with specific forms of harm these communities face based on prior work on marginalized social VR users [14, 17, 18]. Future work should especially focus on understanding how children and teens conceptualize consent in social VR, as they are often particularly affected by and vulnerable to harm in these spaces [35, 36] and may have more varied perceptions of consent. Furthermore, despite the ample sample size (N=39) for an interview study, these findings may not be generalizable to all social VR users, though this is not necessarily the goal of this research, particularly as our participants highlight the desire for more personalized consent options to balance protection with freedom properly. As such, future research should intentionally and explicitly explore diverse communities and VR platforms to provide a broader image of how consent is approached in social VR.

## 6 CONCLUSION

Social VR’s rapid growth as an emerging social space, bolstered by enhanced embodied and immersive social experiences, has been met by growing concerns from CSCW and HCI researchers for social VR’s potential to introduce interpersonal harm [6, 18, 44, 45]. These concerns stem partly from the lack of social norms around acceptable and unacceptable interactions in these spaces, as well as limited, reactive community guidelines and features to address unwanted behaviors and interactions. As such, in this paper, we adopted *consent* as a guiding lens for understanding and designing solutions for interpersonal harm in social VR. Our findings have revealed a complex and nuanced story of how social VR users come to see consent as boundaries, how they (re)purpose existing social VR features and practices for boundary setting, and how their visions for designing future consent mechanics in social VR prioritize and expect a balance between protection and interaction to mitigate interpersonal harm as boundary violation. From this discussion, we offer three user-informed design principles that contribute opportunities for leveraging consent mechanics grounded in the perspectives of actual social VR users. Thus, our work advocates for future research that conceptualizes *harm* in social VR as *boundary violation*, bypassing issues by focusing on universal descriptions of harm and aligning with how actual social VR users identify harms against themselves. We also hope that our work informs the design of future features for preventing interpersonal harm in emerging online social spaces and creating a safer metaverse.

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