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Body of Mine, Yours, and Everyone in Between: Communicating Gender Dysphoria Through Immersive Storytelling

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Abstract

This article explores the potential of new, immersive realities to convey the complex experiences of gender dysphoria and body dissatisfaction, using the innovative and multi-award-winning experience *Body of Mine* as a case study. Recognizing a gap in understanding and empathy towards gender-queer communities, *Body of Mine* employs an innovative full-body tracking solution to place users into the body of someone else, combined with first-person documentary interviews and interactive elements aimed at fostering a deeper connection and insight into the transgender experience. Initial feedback from users indicates a heightened awareness and emotional connection to the challenges faced by individuals with gender dysphoria, as well as an increase in self-body positivity, based on a study conducted in collaboration with the University of Tübingen's Department of Psychology. This project underscores the power of immersive storytelling in fostering embodied understanding, while also acknowledging the ethical complexities and voyeuristic risks when sharing narratives from vulnerable communities, and explores innovative methods for tackling social issues through emerging technology. It concludes by contemplating the implications of immersive technologies for the concept of identity in a world that increasingly transcends the physical body, suggesting a future where the notion of self is not confined to physical form but is fluid, multifaceted, and continually redefined within boundless digital horizons.

Keywords

embodiment; gender dysphoria; identity; immersive; interactive media; LGBTQ+; storytelling; technology; transgender; virtual reality

1. Introduction

In the rapidly evolving landscape of media and communication, immersive technologies such as virtual reality (VR) have emerged not only as tools for entertainment but as potent mediums for empathy and understanding. These technologies, offering an unprecedented ability to "step into someone else's shoes," have ignited discussions around their potential to act as "empathy machines" (Milk, 2015). This term, both celebrated and contested within academic and development circles, suggests a capacity for immersive media to foster a profound connection to the lives and experiences of others, particularly those from marginalized or underrepresented communities (Bollmer, 2017; Bujić et al., 2020; Sora-Domenjó, 2022).

Fostering empathy and understanding towards transgender and gender diverse (TGD) individuals is particularly relevant in today's sociopolitical climate. There has been a significant rise in anti-trans legislation and policies across various regions, aiming to restrict the freedoms of TGD individuals. 2023 saw a record-breaking number of anti-trans bills introduced in the United States, prompting the Human Rights Campaign to declare a first-in-its-history "National State of Emergency for LGBTQ+ Americans" (Human Rights Campaign Foundation, 2024). The severity of these challenges underscores the urgent need for tools and methods that can promote greater understanding, empathy, and solidarity with the TGD community.

This article presents a case study on the VR experience *Body of Mine*, designed to convey complex narratives about gender dysphoria and body dissatisfaction. As both the creator of *Body of Mine* and the author of this article, I bring a unique perspective to this research. My dual role allows for an in-depth exploration of the design, development, and impact of the VR experience, offering insights from both a practical and theoretical standpoint. Recognized with several prestigious awards, including the Producers Guild of America Innovation Award, the SXSW Special Jury Award, and Best XR at Games for Change, *Body of Mine* demonstrates the power of VR to not only tell stories but also to profoundly change the way we connect with and understand our fellow human beings.

Employing a case study approach, this article will explore how *Body of Mine* not only utilizes novel techniques to foster an embodied understanding of intimate experiences but also addresses the intricate ethical challenges inherent in portraying these narratives. This exploration of *Body of Mine* is framed within a comprehensive research context that examines both the technological innovations and narrative strategies used in immersive VR experiences. Drawing on a wide array of references that include seminal works on the psychological impacts of VR, this article positions *Body of Mine* within the ongoing academic discourse concerning VR's capability to authentically replicate human experiences.

2. Background

2.1. Terminology

In this article, we employ specific terminology to ensure clarity and inclusivity when discussing gender and identity, consistent with both academic literature and community usage. The term "transgender and gender diverse" (TGD) is used to encompass transgender (trans) men and women, as well as non-binary individuals, intersex individuals, and those who identify as gender non-conforming. "Queer" is used as an umbrella term that includes not only the TGD community but also individuals who identify as gay, lesbian, bisexual, and

asexual. These broad definitions aim to include the diverse experiences and identities within these communities, thereby ensuring comprehensive representation and fostering a more inclusive understanding of gender and sexual orientation.

2.2. Understanding Dysphoria

Body of Mine aims to promote a deeper understanding of gender dysphoria, a condition experienced by many TGD individuals. Gender dysphoria is characterized by a profound discomfort or distress caused by a discrepancy between a person's gender identity and their sex assigned at birth (American Psychiatric Association, 2013). Research into the etiology of gender dysphoria suggests both biological and environmental factors play roles. Neurobiological studies indicate that certain brain structures in TGD individuals are more similar to those typical of their experienced gender than their assigned one (Bao & Swaab, 2011). Socially, gender dysphoria involves complex interactions between the individual and their surrounding environment, including personal relationships, social interactions, and professional life, often leading to a pervasive impact on mental health and well-being (Meyer, 2003).

From a clinical perspective, gender dysphoria is associated with high levels of psychiatric distress, partly due to societal stigma and discrimination (Jackman et al., 2018). Studies show that individuals with gender dysphoria are at a higher risk for depression, anxiety, and suicide than the general population (Bockting et al., 2013). These risks are exacerbated by factors such as lack of social support, direct victimization, and discrimination (Hendricks & Testa, 2012). Therapeutic approaches for managing gender dysphoria typically include gender-affirming interventions such as hormonal treatments and surgeries, as well as psychological support to address associated mental health issues. Importantly, not all individuals with gender dysphoria seek medical transition; some find comfort in social transition or other forms of gender expression that affirm their gender identity. Similarly, not everyone who transitions experiences dysphoria; some may transition to achieve greater gender euphoria, which is the profound joy that comes from feeling aligned with one's gender identity (Beischel et al., 2021).

Recognizing the profound impact of gender dysphoria on mental health and well-being, it is crucial to explore innovative methods that can foster a deeper understanding of this condition. One promising avenue is the use of full-body VR applications which allow users to experience embodying an identity different from their own.

2.3. Gender Exploration Through Virtual Avatars

In gaming and virtual environments, avatars—digital representations of users, often portrayed as full-body humanlike characters—provide a transformative medium for gender exploration, particularly for TGD individuals, by offering a safe space for exploring different aspects of gender identity without the fear of immediate social repercussions (McKenna et al., 2022). This can help TGD individuals privately acknowledge their gender identity, an essential step before coming out in the real world (Whitehouse, 2022).

Gender-affirming avatars can provide both internal and external validation of gender identity and transition goals, which is especially vital for those not receiving affirmation in their real-world interactions. This validation can significantly impact TGD users in the real world by alleviating the effects of gender dysphoria, aiding in the consolidation of their identity and providing the confidence needed for the coming out process (Baldwin,

2018; Morgan et al., 2020). The ability to consistently present one's true self in virtual spaces can help stabilize and affirm their identity, making it easier to assert and maintain this identity in physical spaces over time (Marciano, 2014).

The interaction between players and their avatars goes beyond simple interaction, potentially forming social relationships where both entities contribute meaningfully. Traditionally viewed through a one-sided, non-dialectical lens, player–avatar relationships can exhibit fully social characteristics such as self-differentiation, emotional intimacy, and shared agency (Banks, 2015). When players embody avatars different from their own identity, such as men playing as female characters, these relationships can promote self-awareness and mutual influence, deepening the overall experience. These dynamics pave the way for more immersive engagements in VR, as further explored in the following sections.

2.4. Embodiment in VR

In VR, the concept of embodiment can be analyzed as a complex interplay between the senses of agency, self-location, and body ownership. These three components work synergistically to create an all-encompassing sense of embodiment that can deepen the level of immersion and emotional engagement in a VR experience (Kilteni et al., 2012).

The sense of agency refers to the feeling of control over actions within a virtual environment and the consequences of those actions. High levels of agency are critical because they affirm to the user that the avatar they control truly acts as their surrogate (Gallagher, 2012). A sense of agency can empower users to take control of their perspective-taking and learning processes, potentially making sensitive topics like gender identity feel less confrontational and more engaging (Ryan et al., 2006).

The sense of self-location involves the perceptual experience of the location of one's self within the environment. In VR, this is manipulated by aligning the visual perspective of the user with that of the avatar. Techniques such as adjusting the first-person perspective to match the avatar's eyes can significantly enhance this sense, making the user feel that they are physically inside the body of the avatar (Lenggenhager et al., 2007). *The Machine to Be Another* is an early example of leveraging the sense of self-location in VR to facilitate gender-swapping experiences by delivering real-time video from one user's head-mounted display to another (Bertrand et al., 2014).

Finally, the sense of body ownership refers to the sensory experience of identifying with and owning one's body. The sensation is typically achieved through multisensory integration, where visual, tactile, and proprioceptive cues are aligned (Kilteni et al., 2012). This integration can lead to proprioceptive drift, a phenomenon where external stimuli alter the perception of one's body parts and shift body ownership (Normand et al., 2011). Techniques such as the rubber hand illusion have shown how synchronous touching of a visible fake hand and an obscured real hand can lead to the sensation of the fake hand being part of one's body (Botvinick & Cohen, 1998). This principle can be extended to VR by synchronizing movements between the participant and an avatar, creating a compelling illusion of the avatar being part of the user's own body (Slater et al., 2009).

The integration of these elements into a cohesive sense of embodiment profoundly impacts users, amplifying emotions and enhancing the immersion of VR experiences. When users are fully embodied in an

avatar, their emotional responses to virtual events can closely mirror their reactions to real-world events. This can be measured through physiological responses such as heart rate and skin conductance, which are more pronounced when users embody an avatar compared to observing an avatar from a third-person perspective (Armel & Ramachandran, 2003; Petkova et al., 2011).

2.4.1. The Proteus Effect

Neurocognitive research emphasizes the significance of the body in understanding others. Studies exploring the mirror neuron system reveal that observing someone else's bodily state activates similar brain regions to those engaged when experiencing that state ourselves (Keysers & Gazzola, 2009). This overlap in brain activity underscores a shared bodily representation between self and others, enhancing our first-person comprehension of other people's experiences. This effect, known as bodily resonance, plays a critical role in various social processes including the understanding of intentions, empathy, and the recognition of emotions (Slater et al., 2009).

The Proteus effect is a phenomenon observed in virtual environments where the characteristics of an avatar significantly influence the behavior and attitudes of the individual who embodies it (Yee & Bailenson, 2007). This effect, named after the Greek god who could change his form at will, underscores the profound influence that virtual embodiment can exert on real-world actions and mindsets. By manipulating avatar attributes such as appearance, race, or age, users often unconsciously align their behavior with the perceived traits of their avatars.

This phenomenon was first demonstrated by Yee and Bailenson (2007), who found that individuals assigned taller avatars acted more confidently in negotiation tasks, while those with more attractive avatars engaged more intimately in social interactions. In a separate study, it was shown that embodying an avatar that resembles Albert Einstein enhanced cognitive performance in problem-solving tasks, indicating the potential of VR to not only transform social attitudes but also to influence intellectual functioning (Banakou et al., 2018). This influence can tap into deeper aspects of identity and self-perception; for example, users embodying avatars of a different race showed reduced racial bias post-experience, while those embodying elderly avatars demonstrated increased empathy towards older adults and reduced age-related stereotyping post-experience (Peck et al., 2013; Yee & Bailenson, 2006).

One of the most promising applications of the Proteus effect is in therapeutic settings. Notably, it has been used to effectively promote healthier body image perceptions by allowing individuals to experience idealized versions of themselves, which can then influence their real-world self-image and behaviors (Fox & Bailenson, 2009). While this has shown considerable promise for individuals with eating disorders by temporarily correcting distorted body perceptions, further investigation is needed to explore how VR can specifically support mental health in TGD individuals by alleviating the symptoms of gender dysphoria (Matamala-Gomez et al., 2019).

2.5. Foundations of Immersive Journalism

The impact of embodiment in VR is magnified when combined with compelling storytelling and human-centric design (Gorini et al., 2011). Building on the ability to walk a mile in another's shoes,

immersive journalism, a format pioneered by Nonny de la Peña, represents a revolutionary approach to storytelling, leveraging immersive technologies to place viewers directly into the news narrative (de la Peña et al., 2010). This method transforms the viewer from a passive observer into an active participant, offering a first-person perspective of events and stories.

One of the most powerful aspects of immersive journalism is its ability to convey complex social issues through experiential understanding. Viewers can, for example, experience the intensity of a refugee journey by stepping into the shoes of the people living these realities, the urgency of food insecurity and health vulnerabilities in the United States, or the realities of racism through the eyes of a Black man (Arora & Milk, 2015; Cogburn et al., 2018; de la Peña, 2012). Direct exposure to situations that otherwise feel distant can foster a deeper sense of urgency and a nuanced view of global and local issues, potentially leading to more informed and engaged public discourse (Immordino-Yang & Damasio, 2007).

The effectiveness of immersive journalism has been documented in various case studies. Schutte and Stilinović (2017) found that participants who experienced *Clouds Over Sidra* via VR reported increased perspective-taking and empathic concern post-experience compared to those who watched it in a 2D format. In another study, participants who were shown a VR experience chronicling the melting of glaciers had higher levels of environmental awareness post-experience than participants who engaged with traditional media (Thoma et al., 2023). Furthermore, a study on the experience *Becoming Homeless* indicates that the positive attitudes fostered by VR can be sustained over longer periods compared to traditional media; participants in this study who underwent the VR experience maintained positive attitudes towards the homeless over time, while those who engaged with traditional media saw their initial positive attitudes deteriorate over the eight weeks following the intervention (Asher et al., 2018; Herrera et al., 2018).

Immersive journalism, while revolutionary in fostering empathy through first-person perspectives, introduces complex ethical issues. Notably, there is the potential for false empathy, where users believe they fully grasp the subject's experience without appreciating its ongoing complexity; improper distance, which may prioritize engagement over the well-being of subjects and viewers; and identity tourism, where deeply personal narratives risk being objectified rather than genuinely understood (Bollmer, 2017; Raz, 2022; Silverstone, 2007). These concerns necessitate careful ethical considerations to ensure that the immersive experience remains respectful and authentic. These themes are further explored in Section 4.

Until now, immersive journalism has focused on placing users in a place or setting that is unfamiliar. *Body of Mine* takes this one step further by placing users into a body that is unfamiliar. Section 3 will analyze the development of *Body of Mine* from a technical and creative perspective, while examining its effectiveness, as well as potential risks, through anecdotal and empirical evidence.

3. *Body of Mine*—A Case Study

Body of Mine emerged from a deeply personal journey. After being outed as queer and subsequently estranged from my family, I began exploring how emerging technologies could provide safe spaces for queer understanding, connection, and healing, at a time when a safe space in the real world felt hard to find. I aimed to leverage the power of VR to create a sanctuary that not only allows queer individuals to explore their identities and connect with other stories from the queer community, but also to serve as a pivotal educational tool for a broader audience.

Body of Mine originated from a community-focused initiative, developed by myself and a team of queer and TGD creators from the University of Southern California and Arizona State University. This student project began as a collaborative effort aimed at leveraging collective experiences and technical skills to address the need for greater representation of queer stories in VR.

3.1. VR Experience Overview

Before entering VR, users are informed of the nature of the experience, and asked whether they have personally experienced gender dysphoria. This aims to be a more inclusive way of identifying cisgender and TGD audiences without forcing individuals to disclose their identity. Cisgender men are placed into the body of a woman, and women into the body of a man. Audiences who have previously experienced dysphoria are able to choose their avatar. This design aims to provide a euphoric experience for TGD audiences, allowing them to embody a gender-aligned avatar, while offering a profound perspective shift for cisgender participants. The avatar they embody is the only difference; otherwise, the experience, narrative, and audio remain the same.

Upon entering *Body of Mine*, users find themselves standing in front of a mirror, inhabiting their newly assigned body. Looking down, they see someone else's arms, legs, and torso moving in perfect synchronicity with their own movements (Figure 1). Touching different parts of this new, virtual body activates audio stories and interviews from TGD individuals, corresponding to that part of their body; touching their chest plays a story about top surgery, while touching their stomach reveals the story of a pregnant trans man.

Users begin the experience standing in the middle of a giant human chest cavity, surrounded by a massive beating heart, contracting lungs, and cavernous ribs that envelop them like a prison (Figure 2). As the experience progresses, this environment gradually transforms into a lush garden, with veins becoming vines,
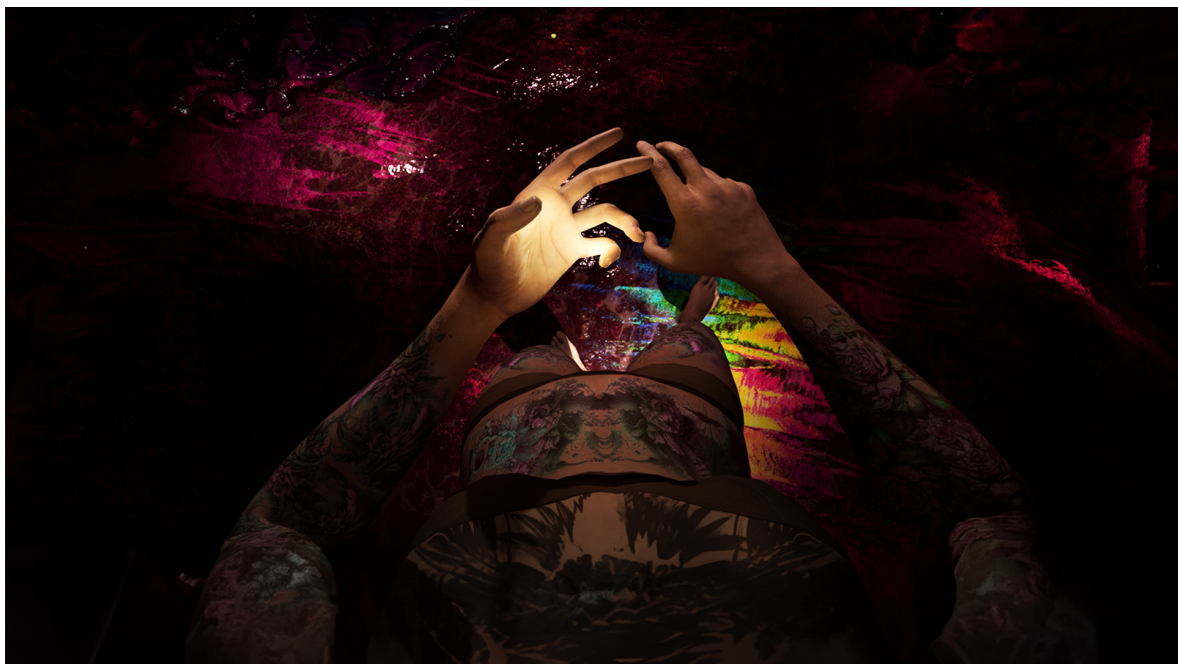

Figure 1. A user looks down at their body in *Body of Mine*.

the lungs transforming into trees, and the heart morphing into a strawberry. Throughout this journey, users transition through the bodies of many diverse individuals. At the climactic moment, users transform into a glowing, genderless, amorphous spirit, symbolizing the pure essence of the human soul. This continuous transformation symbolizes the shared essence of our humanity, irrespective of the bodies we inhabit (Figure 3).

Figure 2. The environment of *Body of Mine*.

Figure 3. The transformation of *Body of Mine*.

3.2. Narrative Development

The development of *Body of Mine* was guided by several key goals. Our primary objective was to create an immersive experience that provides a deeper understanding of the complexities of gender dysphoria. Secondly, we aimed to promote a deeper sense of empathy for TGD individuals by enabling users to connect with the experiences of TGD people in an intimate and personal way. Our third objective was to highlight the diverse and unique stories within the TGD community, offering cisgender audiences a comprehensive perspective while allowing queer audiences to explore identity and connect with the stories of other queer individuals. These design considerations were central to each aspect of the project, ensuring that every element contributes to these overarching goals.

To ensure authenticity, extensive research and a diverse range of testimonials were collected before development commenced. We aimed to provide a holistic understanding of the nuanced dimensions of gender dysphoria by incorporating testimonials from a wide spectrum of voices, including transgender men and women, as well as non-binary, intersex, and gender non-conforming individuals. This diversity of voices creates a multifaceted view of gender dysphoria, rather than relying on a single narrator.

The narrative foundation of *Body of Mine* was laid through intimate audio interviews with primarily friends and peers. These interviews were conducted in a relaxed setting, using only a microphone. While each interview was specific to the individual, sample questions ranged from feelings associated with specific body parts—"what is your relationship with your chest?"—to more poetic, open-ended questions, designed to evoke a deeper, emotional truth—"what does being trans mean to you?" Narrative contributors were given the opportunity to review how their stories would be portrayed, ensuring their consent and comfort. Though all contributors were from the TGD community, they were not explicitly asked to self-identify in the experience. Their stories are not labeled nor assigned to specific avatars, aiming to represent the broader spectrum of gender dysphoria.

Each testimony was then analyzed and organized based on thematic content, emotional tone, and relevance to different parts of the virtual body interaction design. In order to foster a heightened sense of agency in the experience, each story was mapped to specific parts of the virtual body for the user to engage with. This tactile connection between self and other aims to deepen the user's understanding by engaging both the senses and emotions, fostering a more empathetic connection to the experiences shared.

The virtual environment itself serves as a poignant visual metaphor that was integral to the thematic core of the project. The design choice of a ribcage serves two purposes: first, to symbolize the universality of our human experience, regardless of gender; and second, to paint a visual metaphor of feeling trapped inside your own skin, a recurring sensation of dysphoria described by interviewees. Careful attention to detail, including high-resolution textures and precise shadow rendering, increased the environment's photorealism, thereby intensifying the immersive experience (Slater et al., 2009).

The second half of the experience delves into gender euphoria. The transformation of the ribcage into a garden symbolizes the profound process of growing into one's skin and embracing one's identity. This transition is enriched with carefully chosen responses from the interviews, while the user's digital body evolves through avatars of different sizes, colors, genders, and expressions, culminating in a warm, glowing

silhouette representing the human soul. This sequence aims to conclude the experience with a powerful message of optimism, strength, and inspiration, encouraging users to see their personal transformations as beautiful and empowering, while celebrating the many bodies we inhabit.

The expected impact on users includes heightened awareness and empathy towards TGD struggles and a deeper understanding of gender identity complexities. The dissonance of seeing a body different from the users' own, combined with the documentary interviews, is anticipated to enhance emotional sensitivity and appreciation of the emotions tied to gender dysphoria. The poetics of the experience aim to evoke a profound emotional response and thoughtful contemplation, inspiring users to support and embrace diverse gender identities.

3.3. Technological Innovations

To achieve the deep level of immersion required by *Body of Mine*, cutting-edge VR technology and body-tracking systems are essential. This section explores the technological innovations that make this empathetic and immersive experience possible.

The project employs seven HTC Vive Trackers, strapped to the user's wrists, elbows, ankles, and pelvis, equipped with an Inverse Kinematics system in Unreal Engine to accurately replicate user movements onto a virtual human (Figure 4). This setup enables users to move naturally and see their movements reflected realistically in the avatar, strengthening the senses of self-location and body ownership. The Vive Pro Eye was selected as the head-mounted display for precise eye-tracking, translating subtle eye movements and blinking onto the eyes of the virtual human, while a Leap Motion hand-tracking device provides detailed finger tracking, further heightening the sense of body ownership.

Figure 4. Technical setup of *Body of Mine.*

The project leveraged the dissonance of proprioceptive drift to creatively address the limitations of at-home motion capture systems, which often suffer from calibration issues and slight inaccuracies. Instead of seeing these imperfections as drawbacks, the development team embraced them, using this dissonance as a metaphor for the disconnect between mind and body experienced by those with gender dysphoria. This approach not only acknowledged the limitations of current VR technology but turned them into a meaningful part of the narrative, enhancing the thematic depth and emotional realism of the experience.

The use of Unreal Engine's MetaHumans was a strategic choice, driven by their photorealistic capabilities and cost-effectiveness as a free resource. Despite inherent limitations in the MetaHuman Creator, such as predefined body types (short/medium/tall and underweight/normal weight/overweight) and binary gender options (male/female), the project team creatively expanded the representation of diverse gender expressions by customizing avatars with tattoos, surgery scars, and varied hairstyles that transcended traditional gender binaries. All MetaHumans were depicted in simple underwear, avoiding the distraction of more elaborate clothing. Lights and colliders were anchored to joints on the MetaHuman skeleton in order to precisely detect and respond to the user's touch (Figure 5).

Self-funded on a small budget, *Body of Mine* leveraged artificial intelligence to overcome financial and technical challenges. Large language models like ChatGPT generated code and assisted in programming, while diffusion models created artistic assets. This strategic use of AI broadened accessibility to VR creation, enabling authentic storytelling from marginalized communities who may not have large budgets or technical experience. It marks a shift towards democratizing technology, allowing independent creators to develop complex virtual experiences without extensive resources or years of technical experience. Sub-section 3.4 explores the anecdotal, empirical, and social impact of *Body of Mine,* showcasing the potential of democratized technology to resonate globally.
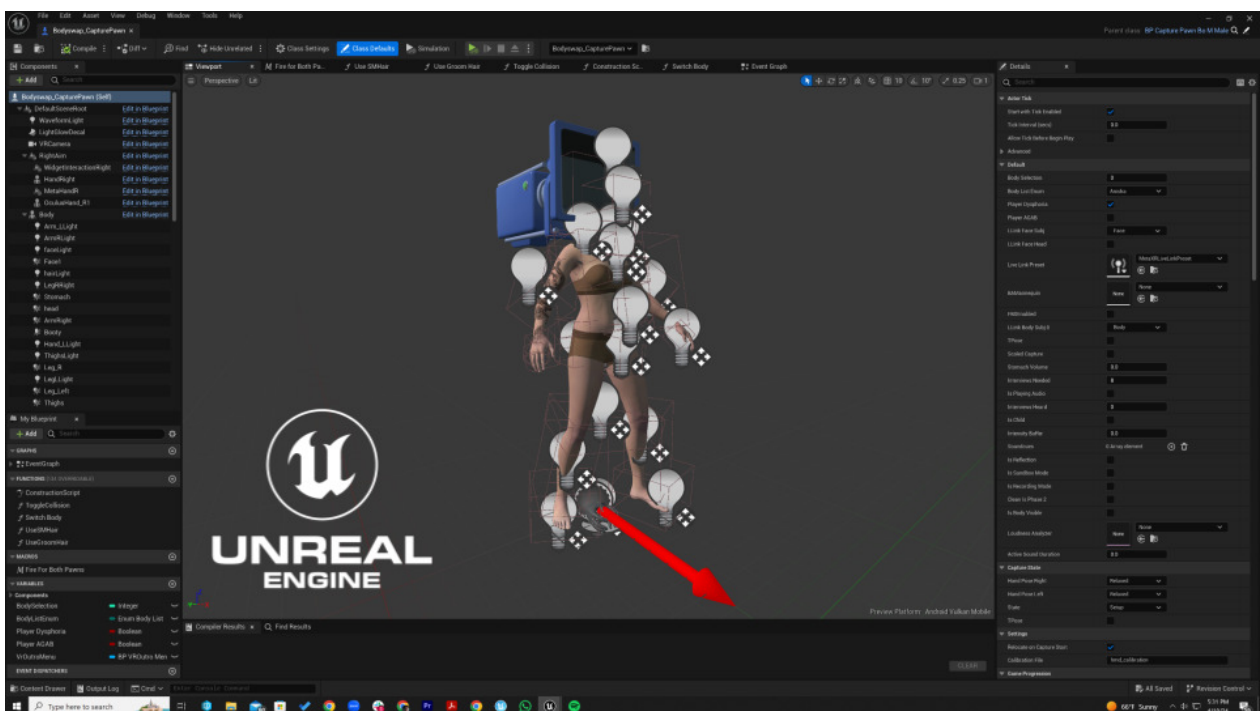

Figure 5. A MetaHuman setup in Unreal Engine.

3.4. Impact

Since its debut, *Body of Mine* has garnered acclaim at international film festivals and impacted audiences worldwide. The piece was celebrated with major awards such as the Producers Guild of America Innovation Award, the SXSW Special Jury Award, a BAFTA Student Award, Best XR at Games for Change, an International Premiere at the Venice International Film Festival, the Social Impact Award at FilmGate, Best VR at both the B3 and deadCenter film festivals, and more. Critics and media outlets recognized the significant impact of the VR experience, with WIRED noting that *Body of Mine* "broke through a psychological barrier few pieces of media ever have" (Ravenscraft, 2023).

The emotional resonance of *Body of Mine* was palpable in the reactions it elicited from viewers. Exhibited in regions like Texas, Oklahoma, and Florida, which face significant challenges regarding anti-trans legislation, the piece served as more than just an artistic expression—it became a catalyst for important conversations. In a viral video of a Pride screening in Oklahoma City, audiences both young and old, cisgender and TGD, are seen emotional while exiting *Body of Mine* (Kostopoulos, 2023). Many expressed that the experience provided them with a deeper understanding of gender dysphoria, with some finding a new comfort in their own identities.

The experience ignited profound personal revelations, enabling individuals to reconcile with aspects of themselves they had previously viewed negatively. One woman emerged with a newfound love for a scar she had long despised, seeing it in a new light after the VR experience. Another, who had spent her life wearing a burqa, discovered a renewed acceptance and appreciation for her body. These powerful transformations underscore the potential of VR to foster greater self-acceptance in ways traditional mediums often cannot.

3.4.1. Embodiment Study

Motivated by such profound reactions, we sought to delve deeper into the effects of the experience on body image perceptions. In collaboration with the University of Tübingen's Department of Psychology in Germany, we designed a study to quantitatively measure these effects using validated psychological instruments.

The study aimed to assess the impact of *Body of Mine* on participants' body image states. The primary objective was to determine if engagement with the VR experience could improve self-image. It was conducted at the B3 Moving Images festival in Frankfurt, Germany, where the experience was available to the general public at a free public art gallery. Each session lasted approximately 30 minutes, during which participants experienced the entire *Body of Mine* narrative from beginning to end. The study sample consisted of 36 English-speaking respondents, who participated voluntarily by opting in with informed consent. The data collection occurred over three days using a pre- and post-experience questionnaire. The demographic breakdown was diverse, with a mean age of $M = 35.9$ ($SD = 12.5$) ranging in age from 18 to 65, including 18 cisgender men, 14 cisgender women, two non-binary individuals, and one transgender man.

Participant recruitment involved individuals who were already intending to experience *Body of Mine* and consented to participate during sign-ups. Gender identification was recorded through an onboarding survey where participants self-identified using a combination of predefined options and free-text entries. Cisgender participants self-identified as such, with no assumptions made based on the absence of a TGD declaration.

The sample may not be fully representative of the general population due to the specific setting of an art gallery. Additionally, due to English being a second language for many participants, language barriers may have influenced responses and/or comprehension of the experience.

We utilized the short form of the body appreciation scale II (S-BAS-2) and the body image states scale (BISS), both featuring 5-point Likert scales. The S-BAS-2, an enhanced version of the original scale, assesses individuals' acceptance of, favorable opinions toward, and respect for their bodies (Tylka & Wood-Barcalow, 2015). This scale has demonstrated strong psychometric properties, including unidimensionality and reliability across different genders and samples. The BISS is specifically designed to measure transient body image states, making it particularly useful for assessing the short-term impacts of interventions (Cash et al., 2002). We performed analyses using R version 4.3.3, employing paired t-tests to compare our pre- and post-results. All analyses were two-sided, with the significance level set at $p < .050$.

Results revealed a statistically significant increase in body appreciation, as measured by the S-BAS-2, $t_{(33)} = -5.44$, $p < 0.001$, $d = -0.93$, from pre ($M = 3.83$, $SD = 0.55$) to post ($M = 4.25$, $SD = 0.53$; Figure 6a). Furthermore, body dissatisfaction, as measured by the BISS, significantly decreased, $t_{(33)} = -3.58$, $p < 0.001$, $d = -0.61$, from pre ($M = 4.72$, $SD = 0.57$) to post ($M = 4.18$, $SD = 0.91$; Figure 6b). For both body-related variables, the effect sizes were large, indicating substantial changes. The S-BAS-2 in this study had a good internal consistency with a Cronbach's alpha of greater than 0.85, while the BISS exhibited poor internal consistency with a Cronbach's alpha of less than 0.39. This suggests that while the results are promising, they should be interpreted with caution. Future research could focus on improving the reliability of the BISS or employing alternative instruments that may provide more consistent measures of body image states.

Regarding the understanding of gender dysphoria, significant improvements were observed. The agreement on a 7-point Likert scale for the item "how well do you understand the concept of gender dysphoria" increased from $M = 3.41$ ($SD = 1.65$) to $M = 4.79$ ($SD = 1.71$), $t_{(33)} = -6.08$, $p < 0.001$, $d = -1.04$. Additionally, agreement with the statement "I identify with the struggles of trans people" rose from $M = 4.61$ ($SD = 1.57$) to $M = 5.44$ ($SD = 1.39$), $t_{(33)} = -3.59$, $p < 0.001$, $d = -0.62$. Similarly, the item "people should be free to change their gender" showed a significant increase from $M = 6.02$ ($SD = 1.19$) to $M = 6.29$ ($SD = 1$), $t_{(33)} = -2.32$, $p = 0.027$, $d = -0.40$ (Figure 7a–c). These results suggest that *Body of Mine* fostered greater empathy and understanding
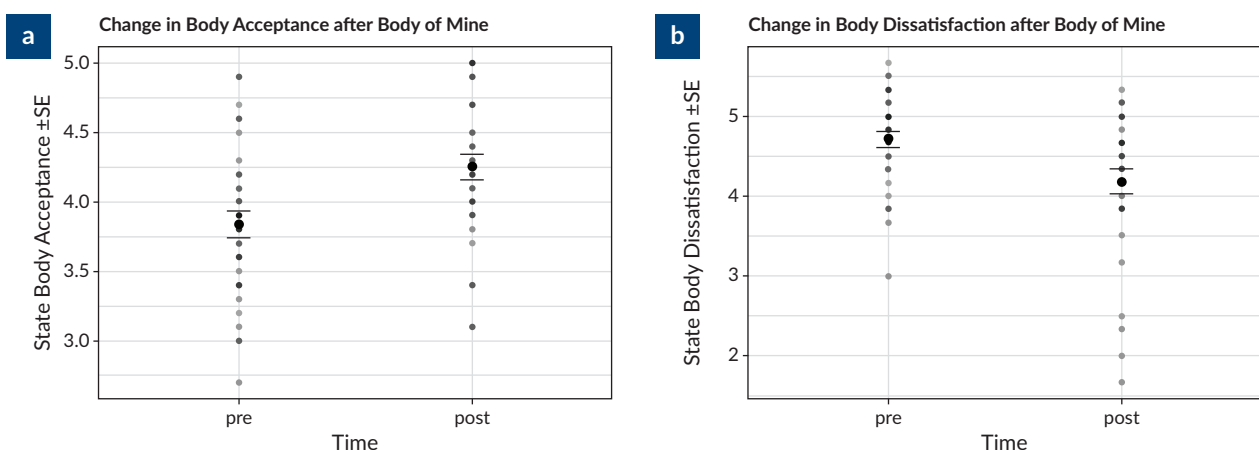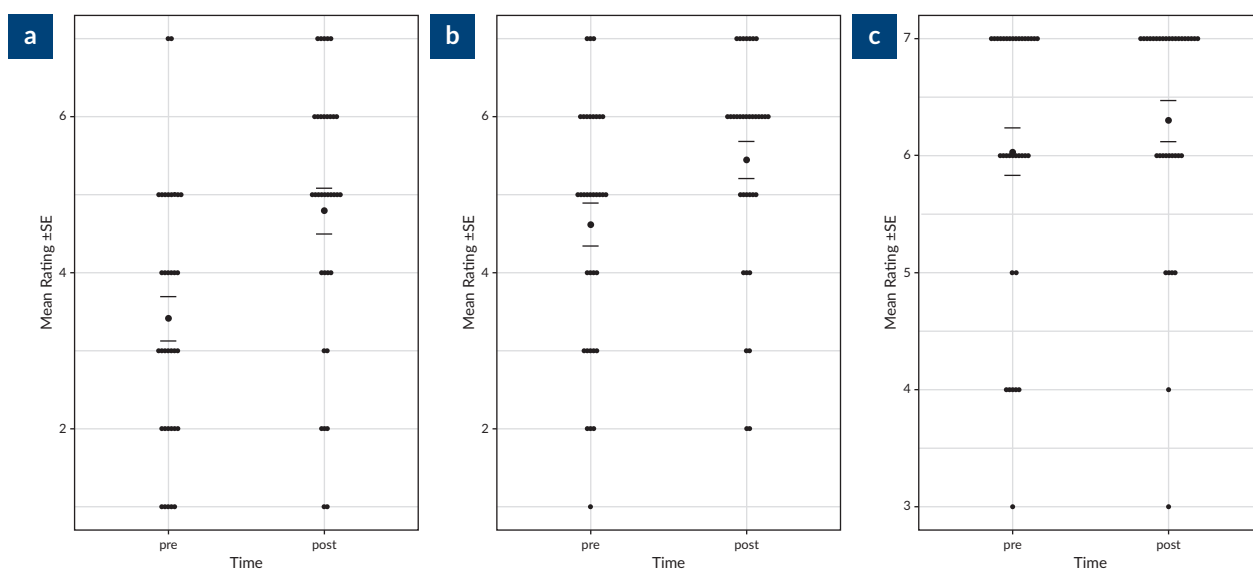

Figure 6. Results of S-BAS-2 (a) and BISS (b).

Figure 7. Results of *Body of Mine* on empathy and understanding using a 7-point scale for the items (a) how well do you understand the concept of gender dysphoria?, (b) I identify with the struggles of trans people, and (c) people should be free to change their gender.

toward the experiences of TGD individuals. The marked increase in identification with the struggles of TGD individuals is particularly noteworthy, indicating that participants not only gained an intellectual understanding of gender dysphoria but also connected it to their own bodily insecurities. This personal connection likely fostered a deeper, more profound sense of empathy, allowing participants to recognize and resonate with the struggles of others on a more intimate level.

Despite the limitations of the study, these preliminary findings are promising and support further investigation into the use of immersive technology to enhance body image perception. The reported improvements in body appreciation and reductions in body dissatisfaction highlight the potential of VR as a powerful tool for addressing body image issues across diverse groups. Future research could explore how experiences like *Body of Mine* can specifically aid individuals living with gender dysphoria, as well as investigate the long-term effects of experiences like *Body of Mine* on perceptions and attitudes towards TGD individuals.

3.4.2. Accessibility and Technological Adaptations

To improve accessibility and reduce the technological complexity of the original setup, a standalone version of *Body of Mine* was developed for the Meta Quest platform. This adaptation was released on the Meta Horizon Store in June 2024, available for Quest 3, Pro, and 2. This version eliminates the need for HTC Vive Trackers, broadening accessibility to a wider audience. The Quest adaptation utilizes the built-in capabilities of the headset for motion capture, providing a highly immersive experience without the need for extensive setup.

While the Quest version offers significant accessibility benefits, there are some tradeoffs. The lack of external trackers results in less accurate tracking, and optimization for mobile rendering means lower poly models, the absence of real-time shadows, and less detailed avatars. Additionally, face and eye tracking features are only available on the Quest Pro. However, these compromises are balanced by the benefit that a much broader

audience can access the experience. Importantly, the power of the storytelling remains uncompromised in the Quest version. The narrative and emotional impact carry significant weight, ensuring that the experience continues to profoundly affect audiences.

The Quest version's ease of use makes it ideal for integration into schools, libraries, LGBTQ+ centers, and other community spaces, promoting broader dissemination and educational use. The original experience, which features more accurate tracking and greater realism, is available on Steam, and is recommended for deeper immersion and research applications. Our two-pronged approach, offering both the high-fidelity original version and the more accessible Quest version, exemplifies our commitment to balancing cutting-edge immersive technology with broad accessibility. This strategy underscores our dedication to ethical integrity and the democratization of immersive technology, ensuring that impactful storytelling is available to all. Section 4 will delve deeper into the ethical implications of immersive storytelling, exploring the challenges and responsibilities that accompany these innovative mediums.

4. Ethical Considerations

In traditional documentary filmmaking, ethical standards are well-established, focusing on the accuracy of the depiction, fairness in representation of the subjects' stories, and respect for the subjects' dignity (Bernard, 2011). However, VR introduces a new dimension to storytelling—simulation—that complicates these ethical considerations. Simulation in VR is not merely about replicating visual and auditory elements of a story, but about reconstructing the sensory and emotional landscape of an experience. While this can significantly enhance empathy and understanding, it also raises critical ethical issues about the authenticity of the experiences being simulated and the impact on viewers (Nash, 2018).

These challenges stem from the need to balance factual integrity with the immersive nature of the medium. Creators must navigate the thin line between enhancing understanding through sensory experiences and fabricating elements that could mislead viewers or misrepresent subjects. This is further complicated by the potential for VR to induce false empathy, where users feel they fully understand and empathize with a subject without recognizing the complexities or continuing struggles that cannot be fully captured in a simulation (Bollmer, 2017). This could lead to over-identification with the subjects, resulting in viewers feeling a personal connection or experience that is not truly theirs, potentially overshadowing the real voices and experiences of the subjects (Nash, 2018).

The risk of exploitation is additionally heightened in VR environments, necessitating careful attention to obtaining informed consent. Subjects may not fully comprehend how their stories and likenesses will be used, or the extent to which their experiences will be immersive and potentially exposed to a global audience. The intimacy and immediacy of these stories can inadvertently lead to voyeurism or "identity tourism," where viewers engage with deeply personal and sometimes distressing stories in a manner that objectifies the subjects rather than fostering genuine understanding or empathy (Raz, 2022).

Another significant concern is the risk of re-traumatization for both the subjects featured in the VR experience and viewers. Subjects, as well as individuals with similar experiences, might relive traumatic events more vividly than they would through traditional media, while viewers are exposed to these intense experiences in a more embodied way, which can lead to psychological impacts not typically associated with

conventional documentary viewing. As a result, immersive experiences can struggle with maintaining the proper distance needed in ethical storytelling (Silverstone, 2007). Without this distance, there is a risk that the immersive experience could prioritize engagement over the well-being of its subjects and viewers.

While the challenges of VR as a medium for documentary work are significant, they should be viewed as opportunities to innovate ethically and responsibly. The inherent limitations of technology mean that an exact, comprehensive simulation of one's lifelong experience is impossible. VR environments can recreate specific scenarios and evoke sensory and emotional responses, but they cannot fully encompass the nuanced, multifaceted nature of an entire human life, with its myriad interactions, thoughts, and feelings experienced over the years. Recognizing these limitations can help creators avoid the pitfalls of over-simplification and misrepresentation, encouraging a more focused and thoughtful approach to storytelling.

Given these constraints, the pursuit of emotional truth becomes a more viable and meaningful objective. Emotional truth captures the essence of experiences in a way that resonates on a personal and profound level with viewers. By conveying the internal realities of subjects—how they feel and what their experiences mean to them—VR can avoid the ethical issues associated with striving for absolute, often unattainable, factual precision. A focus on emotional truth allows VR experiences to engage viewers deeply, creating a space where empathy and understanding can flourish beyond the limitations of traditional narration. It also ensures that stories remain authentic and respectful, as they are grounded in the genuine emotional experiences of the subjects rather than a superficial replication of events. A community-first approach throughout this process is paramount. By engaging directly with the community, the project becomes a collaborative effort that empowers the subjects, and ensures that the final product resonates truthfully with both viewers and those represented.

In *Body of Mine*, emotional truth is communicated through innovative narrative techniques, visual metaphors, and sensory illusions that resonate with the viewer's personal experiences. The transformation of the ribcage into a garden, for example, symbolizes personal growth and self-love. Proprioceptive drift, combined with the imperfections of motion capture, allows viewers to feel a sense of dissonance between their perceived physical self and the virtual representation, enhancing the story's emotional depth. These techniques do not aim to replicate reality but to capture the deeper emotional truths of the subjects' stories. By directly involving the TGD community and prioritizing consent and privacy, the project ensures authenticity and empowers subjects, making the final product resonate truthfully with both viewers and those represented.

As immersive storytelling continues to evolve, it is crucial to recognize that this medium should not be constrained by moral ultimatums, but should instead allow ethical considerations to guide creative and responsible storytelling. Ethical guidelines in VR should encourage exploration and innovation while ensuring that the narratives are crafted with sensitivity and integrity. This evolving journey promises not only to enhance our understanding of complex human experiences but also to expand the horizons of storytelling itself, inviting us all to imagine and participate in shaping the future of immersive media.

5. Implications on Identity

As immersive technologies continue to develop, our understanding of identity is poised for a dramatic shift. Identity, which is traditionally rooted in physical and biological characteristics such as gender, race, and

physical appearance, may increasingly be seen as fluid, modular, and multifaceted, shaped not just by physical attributes but also by our digital representations and experiences (Giddens, 1991).

Digital worlds such as VRChat, and platforms incorporating identity swap features like Snapchat's gender swap filter, serve as early examples of how digital environments are enabling modular and fluid expressions of identity. In VRChat, users can adopt any form, ranging from realistic human avatars to fantastical creatures, thereby exploring diverse identities in safe, controlled environments. This modularity allows individuals to experiment with aspects of their identity in ways that can be both empowering and transformative. While augmented reality filters, such as Snapchat's gender swap filter, currently exist solely through smartphones, it is not difficult to imagine a near future where these filters are seen through wearable devices, challenging the importance of physical over digital representation in the real world.

The ethical implications of these technologies are profound. As we embrace digital identities, issues of consent, privacy, and authenticity become increasingly complex. The creation and manipulation of digital selves also raise questions about the ownership of digital identities and the potential for misuse or harm. Furthermore, there is a risk of deepening the digital divide, where access to advanced technologies is uneven, potentially exacerbating social inequalities.

Alongside these ethical challenges, however, lies a profound potential for not only the liberation of identity beyond physical constraints, but also significant improvements in mental health (Matamala-Gomez et al., 2019). This capability can be particularly transformative for those experiencing gender dysphoria or body dissatisfaction, providing relief and a sense of alignment that might be otherwise unattainable due to the high costs or inaccessibility of transitioning (Whitehouse, 2022). Such technological interventions can serve as vital therapeutic options, offering psychological comfort and support where traditional medical treatments may fall short, and freeing individuals to present themselves in ways that align with their internal sense of identity, unbound by physical or biological constraints.

As immersive technologies continue to evolve, they promise a future where the self is liberated from traditional constraints and free to explore new realms of possibility. Navigating this future requires us to balance the vast potential of these technologies with the significant ethical challenges they present, ensuring their use promotes inclusivity, understanding, and respect for all facets of human identity.

6. Conclusion

The exploration in *Body of Mine* demonstrates the profound impact of immersive storytelling on enhancing empathy and deepening the understanding of complex social issues such as gender dysphoria. While the potential of immersive technologies to reshape our perceptions of identity and enhance human connection is substantial, it also brings forward critical ethical considerations. The risks of voyeurism, exploitation, and the potential for re-traumatization must be navigated with rigorous ethical standards to prevent misuse. A steadfast commitment to emotional realism is essential to overcoming these limitations.

As virtual and augmented realities continue to advance, the concept of a fixed, physical body may become more abstract, with digital avatars and virtual experiences allowing individuals to explore and express their identities in innovative ways. This evolution could profoundly affect how we perceive ourselves and interact

with others, necessitating a redefinition of identity beyond traditional boundaries. Charting the future of immersive technologies responsibly will define the contours of empathy and identity in our increasingly digital world.

Acknowledgments

Conflict of Interests

The author declares no conflict of interests.

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