Virtual Reality as a Bridge to Empathy: A Case Study of the Gaza Time Tunnel VR Experience.

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ABSTRACT

In an increasingly digitized world, immersive technologies like virtual reality (VR) are often lauded as "empathy machines" capable of fostering prosocial attitudes toward distant social and political issues. However, such claims often outpace empirical evidence detailing the specific mechanisms through which VR operates, particularly for complex and polarized geopolitical topics. This study explores the effectiveness of a narrativedriven VR experience in fostering empathy for the Palestinian struggle. Analyzing mixed-methods survey data (N = 186) from participants, we investigate the relationship between prior issue familiarity and self-reported changes in empathy. We find a statistically significant positive correlation, suggesting the VR experience acts as an *empathy amplifier*, particularly for those already engaged with the topic. Furthermore, qualitative analysis reveals that zones featuring personal, emotionally resonant narratives, specifically the "Tragedy of Hind Rajab", were overwhelmingly cited as the most impactful component of the experience. The study concludes by discussing the critical role of personal storytelling in the design of effective VR for social advocacy and highlights directions for future work in immersive media research and conflict education.

Keywords: Virtual Reality, Empathy, Immersive Storytelling, Social Advocacy, Palestinian Conflict

INTRODUCTION

VR has rapidly emerged as a tool for immersive storytelling and advocacy, often described by enthusiasts as the "ultimate empathy machine" (Gorin, 2022). By allowing users to *"walk in another's shoes"* in simulated environments, VR is thought to evoke empathy and understanding more effectively than traditional media. Humanitarian organizations and educators alike have turned to VR experiences to humanize distant crises and social issues (Gorin, 2022). Since the United Nations premiered the 360° VR film *Clouds Over Sidra* in 2015 – a journey through a Syrian refugee camp – VR has been used in fundraising and awareness campaigns with notable success i.e. a 2015 donor conference where *Clouds Over Sidra* was shown raised 70% more aid than projected (Robertson, 2015). Such early anecdotes fueled optimism that VR could transcend the emotional distance often found in news or textbooks.

At the same time, scholars caution against uncritical acceptance of the "VR = empathy" narrative. Sora-Domenjó (2022) argues that we must avoid generalizing the idea of VR as an automatic empathy machine, noting that not all VR experiences uniformly elicit empathy. The immersive nature of VR can provoke strong emotional responses, but the outcomes can vary – from empathy and compassion to voyeurism or even "empathic stress" (Gorin, 2022). Thus, a growing body of research is examining *how* and *for whom* VR fosters empathy, and where its limits lie.

This study contributes to that inquiry by focusing on a specific use case: a narrative-driven VR experience designed to educate viewers on the Palestinian struggle. The Palestinian-Israeli conflict is a deeply polarizing

topic often characterized by entrenched biases and emotional fatigue. We ask whether a carefully crafted VR narrative can *bridge empathy* across this divide. The VR experience in question is a multi-zone virtual exhibit that guides participants through historical and personal scenes of Palestinian life under conflict, culminating in a highly personal story ("Tragedy of Hind Rajab"). By analyzing participants' self-reported empathy changes and reflections, we seek to understand the conditions under which VR might amplify empathy for such a complex issue.

Accordingly, this study is guided by two central research questions:

RQ1: To what extent does prior familiarity with the Palestinian issue influence participants' selfreported empathy after experiencing the VR narrative?

RQ2: Which elements or narrative zones within the VR experience most effectively elicit empathy and emotional engagement among participants?

These questions aim to empirically examine the assumptions surrounding VR as an "empathy machine," while also identifying the narrative and contextual factors that shape users' emotional responses. By articulating these inquiries, the study situates itself within broader discussions on the mechanisms and boundaries of empathy building through immersive media.

In the sections that follow, we review relevant literature on VR in empathy-building, immersive storytelling, educational uses of VR for social issues, and the portrayal of the Palestinian context in new media. We then outline our mixed-methods case study approach, present quantitative and qualitative results, and discuss implications for using VR as a tool of social advocacy and conflict education. In doing so, we aim to ground the enthusiastic claims about VR's potential in empirical evidence and critical analysis.

LITERATURE REVIEW

VR as an "Empathy Machine."

Popular discourse around VR frequently echoes filmmaker Chris Milk's famous claim that VR is the "ultimate empathy machine." This idea suggests that VR's immersive, first-person perspective can generate compassion more powerfully than other media. Indeed, several studies have demonstrated VR's potential to increase empathy and prosocial behavior. For example, a large-scale experiment by Herrera et al. (2018) found that VR perspective-taking produced more sustained empathy and helping intentions than traditional two-dimensional media when participants embodied the experience of a homeless person (Hadjipanayi et al., 2024). In the context of violent intergroup conflicts, Hasson et al. (2019) showed that an immersive 360° video depicting an Israeli–Palestinian confrontation from an outgroup's perspective led Jewish-Israeli participants to exhibit more positive attitudes and emotions toward the opposing group. In that *Enemy's Gaze* study, VR users experienced the conflict "through the eyes" of the other side; subsequent measures showed increased empathy and more peace-promoting attitudes compared to control conditions. Similarly, an earlier Jerusalem-based experiment by Lauder (2019) had Israeli and Palestinian youths record their daily lives on VR cameras; participants who watched the 3-minute VR life narratives of a peer from the other side showed significant increases in empathy and perceived similarity, and a decrease in prejudicial attitudes, relative to those who watched on a flat screen. These findings lend support to the notion that VR's blend of immersion and perspective-taking can evoke empathy in ways that traditional media often cannot.

On the other hand, researchers underscore that VR is not a guaranteed "empathy button." A recent interdisciplinary review challenged the assumption that all VR films inherently elicit empathy, cautioning that results across studies are mixed and context-dependent (see Sora-Domenjó, 2022). Factors such as a user's prior attitudes, the design of the VR content, and the nature of the empathy being measured (affective empathy vs. cognitive understanding vs. behavior) all mediate outcomes. There is also the ethical dimension: some critics note that highly emotional VR experiences can border on *voyeurism*, giving viewers a visceral taste of others' suffering without necessarily translating to meaningful action (Gorin, 2022). In extreme cases, intense VR scenarios might even induce feelings of helplessness or *shame* rather than constructive empathy. The literature thus presents a nuanced picture i.e. VR can *facilitate* empathy, but its impact relies on thoughtful content creation

and an understanding of the audience. This study addresses one oft-mentioned gap: understanding *for whom* VR works best. We specifically examine whether a user's prior familiarity or engagement with an issue (in our case, Palestine) influences the degree of empathy gained from a VR experience.

Immersive Storytelling and Narrative Transportation.

A key strength of VR lies in its capacity for immersive storytelling. By enveloping the user in a 360° audiovisual narrative, VR can invoke a sensation of *presence* i.e. the feeling of "being there" in the virtual world, which in turn can facilitate narrative transportation. Narrative transportation is the cognitive-emotional process whereby an individual becomes absorbed in a story, often leading to greater empathy for story characters and real-life attitude change. VR's interactivity and first-person vantage point can heighten this effect by making the user an *active participant* in the story (Hadjipanayi et. al, 2024). Prior studies highlight that well-crafted narratives in VR, especially those focusing on personal, human-scale stories, can evoke intense emotional responses. A recent systematic review analyzed 20 VR empathy studies and found most VR narratives fell into three categories: (a) personal stories (specific incidents in an individual's life), (b) historical scenarios, and (c) conceptual/educational simulations (Hadjipanayi et. al, 2024). Notably, narratives centering on individuals' hardships (e.g. victims of abuse, members of stigmatized groups, or patients with illnesses) were common and often very impactful. Storytelling in VR was observed to create more intense emotional experiences for audiences, as compared to similar narratives delivered in non-immersive ways (Barreda-Ángeles & Beck, 2021). The immersive quality allows abstract issues to *feel* concrete and personal; for instance, VR can transport a user to a distant refugee camp or conflict zone that would otherwise be inaccessible, fostering direct empathy with people there.

Crucially, the literature also advises that immersive stories must be handled with care. Because VR narratives are so absorbing, there is a risk of oversimplification or reinforcing stereotypes if the content is not nuanced. Hadjipanayi et al. note that VR projects dealing with marginalized groups should avoid purely moralistic or one-dimensional portrayals. Instead, effective VR storytelling should provide context and depth, helping viewers understand the *why* behind people's experiences, not just eliciting pity. When done well, narrative-driven VR can humanize subjects and induce perspective-taking, but when done poorly it could inadvertently other-ize or overwhelm users. In our case study, the "Tragedy of Hind Rajab" segment exemplifies a personal narrative crafted to elicit empathy. Our analysis will consider how participants responded to this story and what that implies for narrative design.

Technology for Social and Political Advocacy.

Beyond individual studies, VR is increasingly being embraced in the realm of social advocacy, from humanitarian campaigns to conflict resolution initiatives. The International Committee of the Red Cross (ICRC) and Médecins Sans Frontières (MSF) have produced VR experiences aimed at shifting public opinion and mobilizing support for humanitarian issues (Gorin, 2022). For example, MSF's *Not A Target* VR film places viewers in a hospital moments before an airstrike – an attempt to elicit outrage and drive home the message that medical facilities should never be targets of war. Such applications recognize that VR doesn't only induce empathy; it can also spark indignation and a sense of injustice, which are powerful motivators for action. Borah et.al. (2024) underscores VR's potential to galvanize support for humanitarian causes across the political spectrum. In an experiment on refugee crises, they found that viewing a refugee camp in VR increased both empathy and sympathy for refugees, which in turn significantly boosted participants' intentions to donate to refugee aid – and importantly, this effect held regardless of the participants' prior political ideologies. In other words, immersive media may help *bridge* ideological divides by humanizing crises in a way that resonates with basic human concern, cutting through partisan frames. This is a promising finding for advocates who hope that VR might engage audiences who are otherwise apathetic or polarized on an issue.

At the same time, field implementations of VR for advocacy reveal practical considerations. Logistically, bringing VR to policymakers or the public requires equipment and careful setup – as seen when the UN set up VR viewing stations at the 2015 General Assembly for *Clouds Over Sidra*. Reports noted that these VR films often had the greatest impact in controlled environments (quiet booths or guided sessions) that maximized immersion (Gorin, 2022). Additionally, measuring the real-world impact (e.g. actual donations or policy changes) remains challenging. While the aforementioned donor conference success is encouraging, critics like Gorin (2022) point out that VR advocacy can sometimes lapse into a *"crisis voyeurism,"* where wealthy viewers

consume the suffering of others as a momentary experience without long-term engagement. Thus, many researchers call for continued study into how to convert VR-induced empathy into sustained action and how to ethically design VR content for advocacy.

The Palestinian Context in Media.

The Palestinian struggle has historically been mediated to the world through news reports, documentaries, and, more recently, social media. Mainstream portrayals often emphasize political violence, statistics, and geopolitical rhetoric, which can inadvertently dehumanize the people living through the conflict. In contrast, immersive media like VR offer an opportunity to present a *ground-level* and humanized perspective. There is growing interest in using VR for conflict resolution and peace education, particularly in the Palestinian-Israeli context. Research in this area suggests that VR might help break down entrenched perceptions by allowing users from one side to virtually experience the everyday life or personal stories of the other side. Beyond the studies already noted (e.g. Hasson et al., Lauder), projects like "Once Upon a Time in Palestine" i.e. a recent interactive XR documentary, have explored VR's capacity to reshape historical narratives and engage youth with personal stories from pre-1948 Palestine (Dahdal & Sayed, 2024). This case study reported that integrating archival photos, oral histories, and VR/AR technology can vividly connect young learners to history in a way that textbooks do not. Another experimental VR intervention, described by Landau et al. (2022), allowed Israeli participants to converse in VR with virtual Palestinians in everyday scenarios; preliminary evidence indicated improved willingness for dialogue and empathy after these virtual intergroup "contacts" (Hasson et.al, 2019). These examples align with a broader pattern in media research: making abstract conflicts personal and interactive can reduce psychological distance and evoke empathy.

However, the Palestinian issue also raises unique challenges. Audience receptivity can vary greatly depending on prior knowledge, political leanings, or even emotional preparedness. A VR experience that elicits deep empathy in one person might trigger defensive backlash in another if it conflicts with their preconceived narrative. Our study pays special attention to this by examining participants' *prior familiarity* with the Palestine issue as a factor. Ultimately, we posit that VR's contribution in this context may lie in its ability to supplement, not replace, traditional education and advocacy. A well-designed VR narrative can offer a complementary perspective – for instance, walking through a virtual refugee camp or listening to a survivor's story in situ – which can reinforce the facts and figures presented in other media with a powerful emotional imprint.

Summary of Gaps: Across these themes, two needs become clear. First, there is a need for empirical data on how different audiences respond to VR about complex social issues. Second, the role of narrative design – especially personal storytelling – in VR's impact needs further exploration. This study addresses both by providing data-driven insights from a particular VR application and highlighting which narrative elements resonated most. In doing so, it contributes to ongoing discussions about VR's promise and pitfalls as a "bridge to empathy." The next sections describe our case study methodology and findings in detail.

METHOD

Research Design

We conducted a case study employing a mixed-methods analysis of post-experience survey data. The case in question is a VR installation titled the *Gaza Time Tunnel*, showcased as a public educational exhibit about Palestine. Participants experienced a guided VR tour composed of six distinct "zones," each representing a scene related to Palestinian history or daily life. After the VR experience, attendees were invited to complete a feedback survey. Our analysis uses both quantitative and qualitative data from this survey to answer our research questions.

The VR Experience

The VR narrative was divided into six sequential zones: (1) Bazaar Market – a street market scene introducing everyday life of Gazzan/Palestinians before the war; (2) Siege Tunnel – an immersive tunnel symbolizing travel restrictions; (3) The Expulsion – a historical reenactment of Gazzan family's displacement in 'Nakba'; (4) Warriors' Museum – a virtual museum of artifacts and stories of resistance; (5) Tragedy of Hind Rajab – a dramatized personal story of a Palestinian family's tragedy; and (6) Bandar Waqaf Malaysia Gaza – a vision of

a hopeful reconstruction project in Gaza supported by Malaysian donors. Each zone lasted 1–3 minutes and was experienced via an Oculus VR headset. Users could look freely around each 360° scene while a narrative (in voice-over and on-screen text) unfolded. The transition between zones was automatic, creating a 15-minute continuous experience. Notably, Zone 5 (Hind Rajab's story) was the emotional climax, presenting a thirdperson perspective during the incident. This zone included spatial immersive audio (e.g., a child's voice, sounds of chaos) to maximize emotional engagement. The VR experience's purpose was explicitly educational and advocacy-oriented: it was developed by a humanitarian NGO to raise awareness and empathy, and was showcased in a controlled exhibit setting (a quiet room with facilitators assisting participants).

Participants & Sampling

A total of 186 individuals participated in the VR experience and completed the survey. Participants were visitors to a public event on social awareness in Malaysia and thus were a convenience sample rather than a randomly selected group. Based on self-reports, the sample included roughly equal numbers of males and females, with ages ranging from 18 to 60 (the largest age group being young adults 18–25). In terms of ethnicity/nationality, the majority were Malay Malaysians, with a minority of other ethnic backgrounds, reflecting the local population demographics. Nearly all participants identified as Muslim, which is notable given the topic (Palestine is of significant concern in the Muslim community). We note that because the exhibit took place in Malaysia, baseline support for Palestine was expected to be relatively high; indeed, as the results will show, many participants already had some familiarity with the issue.

Survey Instrument

The post-VR survey was bilingual (Malay and English) and contained both closed-ended and open-ended items. Key measures included:

1. **Prior Familiarity:** "How familiar were you with the Palestinian issue before this experience?" (5-point scale from Very unfamiliar to Very familiar). This was used to gauge each participant's baseline knowledge/engagement.
2. **VR Empathy Impact:** "Did this VR experience increase your empathy toward the Palestinian struggle?" (response options: Not at all, Yes, slightly, Yes, very much). This self-report item captures the participant's perceived change in empathy as a result of the VR. For analysis, we treated this as a categorical outcome (No vs. Yes).
3. **Zone Impact Ranking:** "Which zone left the strongest impression on you, and why?" (open-ended). Participants could name one of the six zones and explain their choice. This item provides qualitative insight into which narrative elements were most impactful.
4. **Key Takeaway:** "What key message or realization did you gain from this experience?" (open-ended). This prompted participants to articulate any lessons learned or emotional reactions.
5. **VR Comfort and Quality:** We also asked about VR usability aspects (first time using VR? any discomfort like dizziness? rating of visual/audio quality) to ensure technical factors did not confound the experience. Most respondents (around 60%) were first-time VR users, though nearly all (95%) reported no significant discomfort and rated the experience's technical quality highly (mean score ~4.8/5 for quality).

The survey was administered immediately after participants removed the VR headset, with researchers on hand to assist if clarification was needed. All responses were anonymous. The survey was reviewed by the organizing NGO for ethics considerations, and participants provided verbal consent to use their feedback in research.

Data Analysis

For RQ1 (relationship between prior familiarity and empathy change), we performed a chi-square test of independence. We binned "prior familiarity" into three levels (Low, Medium, High familiarity) and "empathy increase" into a binary outcome (No vs. Yes increase – where "Yes, slightly" and "Yes, very much" were combined as Yes for analytical clarity). This allowed us to examine whether those who were already knowledgeable were more likely to report an increase in empathy. We report the chi-square statistic and p-value for this association.

For RQ2 (most impactful elements), we employed thematic analysis on the open-ended responses. All responses were first read in their original languages (with Malay responses translated to English by a bilingual researcher for coding purposes). Using an inductive approach, we coded responses for recurring themes or keywords about why certain zones were impactful. We also tallied the frequency of each zone being named as "most impactful." Additionally, to visualize the qualitative data, we generated a simple word cloud for the combined text of all "Why?" explanations and takeaway messages. This word cloud highlighted the most frequent words participants used (with common stop-words removed). Words like "children," "help," "suffering," "unite," and "humanity" appeared prominently, providing a quick impression of the experience's emotional resonance. We will reference specific illustrative quotes in the results to exemplify the common sentiments.

All quantitative analyses were conducted using IBM SPSS Statistics (Version 26) with a predefined significance threshold of $p < 0.05$. For the qualitative component, two independent coders systematically applied thematic analysis procedures, and any discrepancies were resolved through iterative discussion until full inter-coder agreement was achieved. The integration of quantitative and qualitative strands followed a convergent mixed methods design, allowing the triangulation of statistical trends with emergent thematic insights to produce a more comprehensive and robust interpretation of the findings.

RESULTS

Participant Profile

Among the 186 respondents, 52% identified as female and 48% male. The age distribution was 34% age 18–25, 28% age 26–35, 22% age 36–50, and 16% above 50. In terms of prior exposure to VR, about 58% indicated this VR exhibit was their first-ever VR experience, while the rest had used VR at least once before. Despite varying levels of tech familiarity, nearly everyone reported a high comfort level using the VR headset (mean comfort rating = 4.7/5) and no significant motion sickness or dizziness (only 5% noted mild discomfort). These indicators suggest that the immersive experience was generally well-received on a practical level, allowing participants to focus on content without technical hindrance.

Age Group	Percentage (%)
18–25 years	34%
26–35 years	28%
36–50 years	22%
Above 50 years	16%
Total	**100%**

Responses to the *prior familiarity* question revealed a spectrum: approximately 20% described themselves as "very familiar" with the Palestinian issue (having actively followed news or been involved in related activism), about 45% were "somewhat" or "moderately" familiar, and roughly 35% admitted they knew little beyond basic information. This variability in baseline knowledge is important for interpreting the empathy outcomes.

Empathy Increase and Prior Familiarity

A large majority of participants (84%) answered *"Yes"* to the question *"Did this VR experience increase your empathy toward the Palestinian struggle?"* – with 53% specifying *"Yes, very much"* and 31% *"Yes, slightly."* The remaining 16% responded that the experience did not particularly increase their empathy (no one answered "decreased empathy"). We examined whether these self-reported empathy boosts were independent of prior familiarity. A chi-square test showed a significant association between prior familiarity and empathy increase, $\chi^2(df=2) \approx 7.85$, $p = .02$. In practical terms, participants who were *already* very familiar with the issue were the most likely to report a strong increase in empathy (over 90% of those very familiar said "yes, very much"). Those with only slight prior knowledge were more divided – many still felt more empathetic after VR, but the proportion of strong "very much" responses was lower. This suggests that the VR experience tended to reinforce or amplify existing concern. Rather than converting previously indifferent individuals en masse, it had its most pronounced effect on those who came in with some level of engagement or empathy, deepening their emotional understanding. We interpret this finding with some nuance: it does not mean newcomers gained nothing (even

among the low-familiarity group, a majority did report at least slight increases in empathy), but it indicates the *magnitude* of impact was greater for the pre-engaged audience. In the discussion, we will explore the implications – for instance, the idea that VR might be preaching to the choir unless coupled with additional context for less aware users.

Most Impactful VR Segments

In response to *"Which zone left the strongest impression on you, and why?"* an overwhelming number of participants (approximately 75%) chose Zone 5: "Tragedy of Hind Rajab." This personal tragedy narrative clearly stood out above all others. Participants' explanations for why Zone 5 affected them provide powerful insight. Many mentioned that this segment *"felt real"* and *"hit hardest emotionally."* For example, one participant wrote (translated from Malay): *"Zone 5, Hind Rajab's story, because it was a real case of a family suffering. I have kids the same age [as in the story], so it broke my heart and made me imagine if we were in their place."* Another simply noted: *"Zon 5 – I literally cried. It showed the human cost, not just numbers."* These comments illustrate the potency of personal identification and empathy that the Hind Rajab story evoked. Users were not just observing; many mentally placed themselves in the shoes of the victim or the family, a strong indicator of empathetic transportation.

By contrast, the other zones were cited far less frequently. The next most mentioned was Zone 3: The Expulsion, garnering about 10% of responses. Those who picked Zone 3 generally referenced the historical injustice of being uprooted from one's home, with one respondent saying it *"opened my eyes to how families were expelled – something I had only read about, but VR made it visceral."* Zone 4: Warriors' Museum was selected by a handful of participants (around 8%), often with comments about appreciating the history of resistance but noting it was "less emotional" than Zone 5. Zones 1, 2, and 6 were rarely singled out as "most impactful" (each under 5%). This is not to say they had no effect – indeed, in other parts of the survey many did praise the market introduction (Zone 1) as immersive and the hopeful ending (Zone 6) as a nice closure – but when forced to choose one standout, the tragic personal story dominated responses.

The word cloud analysis of open-ended explanations further reinforces these findings. Words like *"children," "family," "tragedy," "innocent," "sad,"* and *"real"* were among the most frequent in the Zone 5 explanations. In contrast, words tied to other zones (e.g. "history," "tunnel," "market") appeared much less often. This indicates that participants were particularly struck by content that portrayed Palestinians as relatable individuals with families and personal grief, rather than as abstract figures in a political or historical narrative. Personal, emotionally charged storytelling had the greatest impact, aligning with our expectations from narrative transportation theory and prior VR studies emphasizing personal narratives (Hadjipanayi et. al, 2024).

Qualitative Themes – Emotional and Moral Takeaways n the general "key message or realization" question, several themes emerged from participants' written answers:

1. **Humanization of Suffering:** Many participants expressed that the experience "made me see Palestinians as people just like us." One wrote, "They are humans too, not just statistics on the news." This reflects a humanizing effect – participants internalized the idea that behind political headlines are ordinary people with whom they can empathize.
2. **Empathy and Urgency to Help:** A sizable portion mentioned a heightened urge to help or solidarity. "We need to help them because they are suffering and it's not their fault," one respondent said. Words like "help," "support," "donate" recurred, suggesting the VR moved some viewers from passive empathy to an actionable mindset (at least in intent).
3. **Anger and Injustice:** Some participants highlighted feelings of anger or outrage at what they saw. For example: "I realized how cruel and unjust the situation is – it made me angry that this is happening." This indicates that, beyond empathy (sorrow for victims), the VR also instilled a moral indignation in a few viewers, which can be a precursor to advocacy.
4. **Gratitude and Perspective:** Interestingly, several respondents reflected on their own life circumstances, expressing gratitude. Comments like "I am thankful to be in a peaceful country" or "It made me appreciate how safe my life is" were present. This shows the VR experience prompted selfreflection – viewers contrasted their reality with what was depicted and felt a mix of empathy and personal gratitude.

5. **Call for Unity and Awareness:** Especially among Muslim participants, there were notes about unity ("We Muslims must stand united against oppression") and a resolve to spread awareness ("I will share what I learned with others"). This indicates the VR not only imparts information but also a sense of collective responsibility.

These qualitative insights complement the quantitative result that prior familiarity influenced empathy outcomes. Those who were already familiar often wrote more nuanced reflections, sometimes referencing specific historical or religious context in their answers. Meanwhile, those less familiar tended to focus on broad humanitarian sentiments (e.g., "they are humans, they suffer"). Both types of responses signify empathy, but the depth differed.

To summarize the results: The VR experience was overwhelmingly effective at eliciting empathy, especially among participants who already had some connection to the issue. The most impactful content was the deeply personal narrative of Hind Rajab, underlining the power of individual stories in VR. Participants left with stronger emotional engagement – many reported feelings greater empathy, a desire to help, and a more humanized understanding of the Palestinian people. However, our finding that those with higher prior awareness experienced the strongest empathy boost suggests that VR's impact can depend on the viewer's baseline perspective. We explore the implications of these results in the next section.

DISCUSSION

Our case study set out to examine whether an immersive VR narrative could foster empathy around a complex political conflict, and what factors might modulate this effect. The results provide cautious optimism along with valuable nuance. Consistent with much of the extant literature, we found that VR can indeed serve as a *bridge to empathy* – participants reported heightened empathetic concern and emotional engagement after virtually "stepping into" scenes of Palestinian life. The narrative-driven approach, especially the focus on a single family's tragedy, resonated strongly, reinforcing the idea that personal stories are central to VR's empathic power (Hadjipanayi et al., 2024). In line with previous studies where embodying or observing an individual's experience increased users' compassion (e.g. VR scenarios of illness or homelessness), our VR experience's most compelling segment was the one that put a human face on the conflict. This suggests designers of VR for social issues should prioritize first-person narratives and character-driven content to maximize emotional impact.

However, our findings also contribute a critical wrinkle to the "empathy machine" narrative. The significant correlation between prior familiarity and reported empathy gains indicates that VR might function more as an "empathy amplifier" than a creator of empathy ex nihilo. Those participants who entered the experience with some knowledge and emotional investment in the cause experienced the greatest surge in empathy. In other words, VR seemed to *amplify* their pre-existing concern by making the issue even more immediate and personal. This aligns with what communication scholars call the schema congruence effect – when new information (in this case, a vivid narrative) fits into an existing mental framework or interest, its impact is magnified. Participants already primed to care about Palestine had a context to assimilate the VR experience deeply, potentially leading to a kind of confirmation and strengthening of their feelings. By contrast, participants who knew little about the issue still felt empathy (many were moved by what they saw) but perhaps lacked the background to fully contextualize or retain the depth of the experience, resulting in comparatively smaller self-reported changes.

This dynamic offers a noteworthy contrast to Mu and Borah's (2024) finding that VR could increase willingness to help refugees *regardless* of politics (Ferguson, 2024). How do we reconcile these points? One possibility is the difference in measures and context: Mu and Borah looked at *intentions to donate* after a brief VR exposure, and they did find increases across ideological groups. Our measure was *self-perceived empathy increase*, which is more subjective and possibly influenced by a person's baseline. It could be that even if empathy (as an internal feeling) was higher for those already engaged, VR still educated and positively influenced the less familiar individuals – just to a lesser degree on the empathy metric. It is encouraging that even among participants with minimal prior knowledge, very few were untouched by the experience; almost all reported some empathy increase or at least a significant takeaway ("I didn't know it was this bad," as one person essentially noted). This speaks to VR's ability to quickly inform and emotionally engage newcomers. The implication for practitioners is that VR can be effective both as a preaching-to-the-choir tool (reinforcing and energizing supporters) and as an eye-opener for the uninformed, but the magnitude of effect may differ. Future studies could delve further into

how to design VR content that maximizes impact for "cold" audiences – perhaps by providing more background narrative or interactive context for those who start with less knowledge.

Another important discussion point is the nature of empathy elicited and its ethical use. Many participants expressed not only sadness (affective empathy) but also moral outrage and a desire to act. This touches on the distinction between *empathy* (feeling with someone) and *compassion* or *solidarity* (feeling motivated to help). VR creators often aim for the latter – converting empathy into action. Our qualitative data showed seeds of this conversion: people talking about wanting to help, sharing the message, uniting against injustice. That is a positive outcome and aligns with the goals of advocacy-oriented VR. Nonetheless, one must consider the sustainability of such reactions. Research suggests that intense emotional experiences can have a short half-life; what matters is if they lead to sustained engagement or policy changes (the classic problem of "empathy fatigue" or slacktivism). We did not track participants longitudinally, so we can't say how enduring the effects were. It's possible that without follow-up or avenues to act (e.g., donation links, campaign memberships), the empathy spike could fade into a mere memory of a "moving experience." This highlights a practical recommendation: VR experiences used in activism or education should be part of a larger engagement strategy, offering users post-experience resources or actions. In our case, since the exhibit was run by an NGO, they did provide pamphlets and suggestions for how to support Palestinian aid efforts. That likely helped some participants channel their emotions productively (some survey comments mentioned they signed up for a mailing list or donated on-site). Future research could examine conversion rates – for example, do VR-inspired viewers volunteer or donate at higher rates? Early evidence is promising (Robertson, 2015), but more data is needed for robust conclusions.

The dominance of the Hind Rajab story in participants' feedback also raises a discussion about the importance of narrative choice. The fact that one segment so overshadowed the others suggests that not all parts of an immersive experience will leave an equal mark. For the curators of such experiences, this is a reminder that packing a VR tour with too many segments or messages might dilute the overall impact – often one or two key stories will carry the emotional weight. It might be beneficial to focus on developing those deeply and perhaps simplifying or shortening less impactful portions. In our VR design, zones like the Bazaar or the Museum provided context and variety, but arguably the emotional crescendo was what people walked away remembering. An analogy can be made to filmmaking: a documentary might include many facts and scenes, but it's the personal interview or climax that stays with the audience. VR is no different in that respect. Our findings echo what Hadjipanayi et al. (2024) concluded: empathy in VR is "shaped throughout the overall narrative experience," and moments (especially endings or resolutions) can greatly influence the take-home feeling (Hadjipanayi et. al, 2024). Interestingly, some research has debated whether *happy* or *tragic* endings yield more empathy. Our experience had a somewhat hopeful final zone after the tragedy, attempting to end on a note of hope (rebuilding Gaza). Yet participants largely fixated on the tragedy. This might imply that, at least in the short term, sorrow and tragedy have a stronger emotional pull than hope in VR. It could also be that the hopeful part was too brief or abstract to compete with the vivid personal story. For designers, this is a delicate balance: one doesn't want to traumatize the audience or leave them in despair (which could lead to inaction or distress), but one does want to create a memorable emotional experience. A possible improvement could be to allow users more time to process and resolve the emotions – maybe through an interactive debrief or a narrative catharsis – something to consider in future iterations.

From a theoretical standpoint, our case reinforces the concept of VR enhancing *presence* and *perspective-taking*, which are key mechanisms behind empathy. Many participants essentially described moments of presence (feeling "there" in Gaza, feeling like it could be them). That psychological state likely facilitated the empathy and understanding measured. The results are thus in harmony with embodied cognition theories: when people experience even a proxy of someone's life (seeing through their eyes in VR), they could undergo attitude shifts like if they had real-life contact. This has big implications for peace education and conflict mediation. While VR is not a panacea, it offers a scalable way to enable perspective-taking that might otherwise require direct, potentially unfeasible contact between groups. For instance, it's obviously difficult to bring large numbers of Malaysians to Gaza or Gazans to Malaysia, but a VR simulation can bridge that gap virtually. According to the United Nations Department of Political and Peacebuilding Affairs (2024) and various peacebuilding organizations are already experimenting with such uses of VR. Our findings add evidence that these efforts are on the right track, at least in terms of fostering empathy and awareness. A noteworthy point is that VR might need to be tailored to different audiences: for a generally sympathetic audience (like our Malaysian participants),

the content can dive straight into emotional storytelling. For a more sceptical audience, a different narrative approach might be needed – perhaps more interactive, allowing them to ask questions or explore at their own pace, to overcome initial resistance. This is speculative, but it would be valuable to test VR with groups holding opposing narratives (say, Israeli and Palestinian youth) to see how each respond and whether empathy can be increased mutually. Some early work (e.g. the *Enemy's Gaze* study) suggests yes (Hasson et. al, 2019), but more cross-cultural research is warranted.

Limitations

While our study yielded valuable insights, several limitations should be acknowledged. First, the use of selfreported empathy change is inherently subjective; participants may have felt compelled to report greater empathy due to social desirability, particularly given the humanitarian context of the exhibit. We sought to minimize this bias by ensuring participant anonymity and stressing the importance of honest feedback, yet the risk remains. Additionally, the absence of a control group prevents us from conclusively attributing increases in empathy to the VR experience itself; it is possible that any engaging educational material, i.e. a compelling video or live testimony, could have produced similar effects among an already sympathetic audience. Although previous research (e.g., Hadjipanayi, 2024) generally finds VR to be at least as effective, if not more so, than non-VR media in eliciting empathy, our confidence in the unique contribution of VR is tempered by these methodological constraints.

Importantly, although we examined demographic and experiential variables to account for potential confounders, residual confounding may still be present. Future research could address this by employing multivariate statistical models, such as logistic regression, to adjust for possible confounding factors. Alternatively, experimental designs that randomize participants across different conditions could help isolate the specific effect of prior familiarity or other key variables on empathy outcomes.

Another significant limitation concerns the cultural context and sampling strategy. Our sample consisted almost entirely of Malaysian Muslim visitors, many of whom likely approached the Palestinian issue with pre-existing positive attitudes. This convenience sample limits the generalizability of our findings, as outcomes may differ substantially in more neutral or oppositely predisposed populations. Replicating this study in diverse international settings or with participants holding a variety of initial perspectives would provide a clearer picture of VR's capacity to shift attitudes versus merely amplifying existing leanings.

Finally, the generalizability of our results is also constrained by the sample size (N = 186). While sufficient for exploratory purposes, this number may not capture the full range of perspectives present in broader or more ideologically varied populations, especially given the highly polarized nature of the topic. Moreover, reliance on self-reported empathy measures introduces the possibility of bias and may not accurately reflect lasting changes in attitudes or behaviors beyond the immediate aftermath of the VR experience.

Future Directions

Our study opens several avenues for further investigation. One is longitudinal impact – do the empathy and intentions reported immediately after VR translate into long-term attitude or behavior change? Follow-up surveys or behavioral tracking (such as observing if participants later engaged with related content or donated) would be illuminating. Another direction is content optimization: experimenting with different narrative elements in VR (for example, what if we told two personal stories instead of one? or what if the user could *interact* and make choices in the scenario?) to see how that affects empathy outcomes. There is also room to explore the role of agency in VR – our experience was mostly passive (the user watches events unfold). Some VR researchers argue that giving users active roles can deepen impact, while others caution it can distract or even induce guilt (Sora-Domenjó, 2022). Finding the right balance between *immersion* and *interaction* is an ongoing challenge in VR design for social issues. Lastly, multidisciplinary research involving psychologists, educators, and conflict resolution experts could help in developing standardized measures for "VR-induced empathy" and share best practices on ethical deployment.

In conclusion, the *Gaza Time Tunnel* succeeded in its immediate aim: to make distant suffering feel personal and urgent. Our case study adds to the growing evidence that VR, when thoughtfully utilized, can humanize

narratives in powerful ways that resonate with viewers. It also provides a reality check that such technology is most effective when integrated into a broader context – both in terms of the user's prior knowledge and the follow-up actions encouraged. For educators, activists, and organizations considering VR, our findings highlight the importance of personal storytelling and understanding your audience. VR is not magic; it cannot singlehandedly solve complex social conflicts or instantly convert everyone to a cause. But as part of a comprehensive empathy-building and educational strategy, it offers a compelling medium to engage hearts and minds. With further research and careful design, VR has the potential to be a transformative tool in social science and advocacy, truly bridging gaps of understanding one immersive story at a time.

CONCLUSION

This study examined a narrative-driven VR experience focused on the Palestinian struggle and assessed its capacity to foster empathy and engagement. Through a mixed-methods case study with 186 participants, we found that immersive storytelling in VR can significantly increase viewers' empathetic understanding, validate earlier claims about VR's emotive power, and shed light on the nuances of its effectiveness. The VR experience – particularly its deeply personal narrative segment – left a profound impact on participants, making a distant conflict feel immediate and humanized. Participants not only *felt* more empathetic but also reflected a readiness to support and advocate, indicating that VR can spur moral imagination and prosocial intentions.

However, our findings also emphasize that VR is most potent as a complement to existing awareness. Those with prior familiarity with the issue experienced the greatest empathy gains, suggesting VR amplified their concern. This is a valuable insight for practitioners: the impact of VR might be maximized when targeted at audiences who have some baseline interest or when paired with preparatory or follow-up materials for those who don't. In the context of the Palestinian-Israeli narrative, VR proved to be a powerful tool for reinforcing the human reality behind political issues, which is often lost in conventional media coverage.

In closing, the *Gaza Time Tunnel* demonstrates both the promise and the challenges of using VR for social science and advocacy. It validates VR's ability to evoke empathy across cultural distances and provides evidence that immersive personal narratives can engage and move audiences in ways that traditional media sometimes cannot. At the same time, it calls for a thoughtful approach to deploying VR that recognizes the importance of narrative design, audience background, and ethical considerations in creating lasting positive change. As VR technology becomes more accessible and sophisticated, we anticipate it will play an increasingly prominent role in education, humanitarian work, and peacebuilding efforts. This study contributes a piece of the puzzle in understanding how that role can be harnessed effectively. By bridging the gap between *knowing* and *feeling*, VR has the potential to not just inform minds but also touch hearts – a dual impact that is crucial for tackling the social challenges of our time.

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