

THE LONG-TERM EFFECTS OF VIRTUAL REALITY ON EMPATHY TOWARDS HOMELESS AND INTENTION TO HELP: THE MODERATING ROLE OF CAUSE INVOLVEMENT

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ABSTRACT

In a context where virtual reality (VR) is emerging as a promising tool for fostering prosocial engagement, this study aimed to deepen our understanding of its lasting effects on empathic responses and intentions to help. The main objective was to examine the long-term effects of immersive VR (vs. non-immersive) on empathy and intention to help, while taking into account the level of personal involvement in the cause as a moderating variable. A laboratory experiment was performed with 153 students, collecting data at two time points: immediately after exposure to the virtual experience and three months later. The results reveal that the long-term effect of immersive VR on empathy is significantly stronger than that observed in the non-immersive VR condition. However, no significant difference was found in the intention to help between the two experimental conditions. Furthermore, the analyses show that empathy plays a complete mediating role in the long-term relationship between immersive VR (vs. non-immersive) and intention to help. Finally, the results highlight that cause-involvement positively moderates the relationship between empathy and intention to help: the more participants feel personally involved in the cause, the stronger the translation of empathy into intention to help.

Keywords: Immersive virtual reality; homelessness, empathy, intention to help; cause involvement, longitudinal approach.

1. INTRODUCTION

Charitable giving plays an essential role in contemporary societies: it contributes to the redistribution of resources, the reduction of inequalities and the consolidation of social cohesion (Gu and Chen, 2021). In a context marked by a proliferation of humanitarian causes and information overload, non-profit organizations are constantly seeking to renew their communication strategies in order to capture the public's attention, elicit empathy and encourage civic engagement. Among the emerging tools, virtual reality (VR) is gradually establishing itself as an immersive medium with strong emotional potential, capable of offering individuals a sensory and narrative experience that allows them to 'live' the reality of others (Nouri et al., 2025). Increasingly used in awareness-raising and fundraising campaigns (Kandaurova and Lee, 2019), immersive VR is now seen as a strategic lever for prosocial communication and social marketing, including in the non-profit sector (Moriuchi and Murdy, 2021). With its ability to reproduce realistic

and engaging environments, it promotes an experience of presence and emotional identification that can intensify empathetic responses (Shin, 2018; Nouri and Bouzaabia, 2025).

In this context, scientific interest in the links between immersive VR and prosocial behaviors, such as charitable giving, has grown considerably (Kandaurova and Lee, 2019; Moriuchi and Murdy, 2021; Kristofferson et al., 2022; Frechette et al., 2023; Nouri et al., 2025). Several studies highlight the potential of immersive VR to increase awareness of social causes, and strengthen prosocial behaviors (Rodrigues et al., 2023; Nouri et al., 2025). However, several gaps remain in the literature. On the one hand, the long-term effects of exposure to immersive VR remain largely unstudied (Frechette et al., 2023). Most studies focus on immediate post-exposure measures, neglecting the crucial question of the sustainability of emotional and behavioral effects over time. On the other hand, individual factors that can modulate these effects, such as the degree of personal involvement in the cause (cause involvement), are rarely considered, even though they are a major determinant of prosocial motivation (Thomas et al., 2024). In response to these limitations, the present study aims to analyze the long-term effect of immersive VR (vs. non-immersive) on empathy and intention to help, while also examining the moderating role of personal cause involvement. Based on these objectives, several research questions guide this study:

- RQ1: Does exposure to immersive VR produce greater long-term effects on empathy and intention to help than non-immersive VR?
- RQ2: Does empathy influence long-term intention to help?
- RQ3: Does the level of personal involvement in the cause moderate the effect of empathy on intention to help?

This research is structured as follows: the first section presents the theoretical framework and research hypotheses, based on models of empathy and prosocial engagement. The second section describes the methodology adopted, including the experimental protocol and the measures used. The third section presents the empirical results and their discussion. Finally, the last section presents the main theoretical and practical contributions of the study, as well as its limitations and avenues for future research.

2. LITERATURE REVIEW

Donations to charitable organizations are now an essential form of prosocial behavior, reflecting a growing engagement with social and humanitarian causes (Urbonavicius et al., 2019). These practices are widely encouraged by non-profit associations and humanitarian organizations, whose mission is to mobilize financial resources to support major societal issues (Wallace et al., 2017). In this context, VR is emerging as a technology offering new perspectives for social marketing (Nouri et al., 2025). More and more non-profit organizations are incorporating VR into their communication and fundraising strategies in order to strengthen donor engagement (Gurerk and Kasulke, 2018; Nouri et al., 2025). Faced with media saturation and growing competition for public attention, social marketers perceive VR as a tool capable of provoking deep emotional responses and raising awareness of often-neglected humanitarian crises (Kandaurova and Lee, 2019). VR makes it possible to design immersive and persuasive experiences, offering individuals the opportunity to virtually experience the daily reality of vulnerable populations, such as homeless people (Kristofferson et al., 2022; Nouri et al., 2025). This experiential approach not only promotes cognitive understanding of social issues, but also elicits an emotional response that can translate into concrete supportive behavior (Nouri et al., 2025).

In a context where contemporary societies are faced with increasingly complex social and humanitarian challenges, understanding the mechanisms that promote prosocial behavior appears

essential (Bacca-Acosta et al., 2023; Nouri et al., 2025). According to the theory of empathy developed by Hoffman (2000), empathy is considered a psychological mechanism that plays a central role in the moral development of individuals and is a fundamental driver of altruistic actions. It allows individuals to feel, understand, and share the emotions of others, thereby facilitating the implementation of helping behaviors (Kandaurova and Lee, 2019; Wang et al., 2024). From this perspective, VR is a particularly promising tool, as it offers an immersive and captivating experience that allows users to explore complex social issues (Nouri and Bouzaabia, 2025). By immersing individuals in a simulated environment that replicates the situations and challenges experienced by others, VR promotes a deeper understanding of the importance and urgency of these issues (Kandaurova and Lee, 2019). Often referred to as the “ultimate empathy machine,” VR stands out for its ability to place users at the heart of rich and realistic sensory experiences that vividly reproduce another person's point of view (Herrera et al., 2018; Barbot and Kaufman, 2020). This interactive device thus facilitates perspective-taking, a cognitive and affective process that involves imagining a situation from another person's point of view. By “putting themselves in the shoes” of a virtual character—for example, a homeless person—users are led to feel more directly the emotions and constraints experienced by that person (Ahn and Bailenson, 2011; Wang et al., 2024).

Research on the relationship between IVR and empathy has developed in various directions. One of the main areas of focus is evaluating VR's ability to elicit stronger empathetic responses than other media forms (Bacca-Acosta et al., 2023). In this regard, several comparative studies have highlighted the superiority of immersive VR (IVR) in terms of emotional and cognitive stimulation. For example, Rodríguez and Rozo (2022) showed that an interactive video game could generate more empathy than a traditional documentary on the same topic. Similarly, Cohen et al. (2021) observed that 360° videos induced higher levels of empathy than 2D videos. Han et al. (2022) demonstrated the effectiveness of IVR in enhancing participants' empathic responses, while other empirical work has explored its influence on prosocial attitudes and behaviors (Frechette et al., 2023; Rodrigues et al., 2023; Nouri et al., 2025). For example, Frechette et al. (2023) showed that VR could improve perceptions and attitudes toward homeless people, while increasing users' intention to help.

Despite the importance of these studies, they remain limited to assessing the immediate effects after exposure to immersive virtual reality, without considering the persistence of these effects in the long term. However, recent research on IVR highlights a distinction between its short- and long-term effects, depending on the field and context of application. For example, in the healthcare sector, Huang and Yang (2022) showed that IVR provides immediate emotional benefits, including improved mood and reduced stress, but that these effects tend to diminish over time. These observations were corroborated by a subsequent longitudinal study conducted by Huang et al. (2025), which found that some improvements persisting up to two months. In another area of application, Lukander et al. (2025) demonstrated that the use of IVR in workplace safety training produces both immediate and lasting positive effects. In the long term, interactivity promotes the adoption of proactive safety behaviors and facilitates the sustainable integration of good professional practices. In light of these studies, it is therefore reasonable to suppose that the long-term effects of IVR on empathy and intention to help will be greater than those produced by non-immersive VR. Consequently, the following hypotheses are formulated:

H1: The long-term effect of immersive VR on empathy is greater than the effect produced by non-immersive VR.

H2: The long-term effect of immersive VR on intention to help is greater than the effect produced by non-immersive VR.

Empathy is defined as “sensitivity to, and understanding of, the mental states of others” (Smith, 2006). It is generally conceptualised as a two-dimensional phenomenon, comprising emotional empathy and cognitive empathy (Bacca-Acosta et al., 2023). On the one hand, emotional empathy refers to a person's ability to feel or be emotionally affected by the experiences or emotions of others (Herrera et al., 2018). On the other hand, cognitive empathy refers to the ability to understand the thoughts, intentions, and emotions of others—a process often associated with perspective-taking (van Loon et al., 2018). The distinction between these two forms of empathy is based on the nature of the process involved: while cognitive empathy involves understanding and mentally representing another person's experience, emotional empathy manifests itself as a direct emotional resonance with the situation experienced by another person (Bacca-Acosta et al., 2023). The literature consistently highlights that empathic emotions are a key determinant of prosocial behaviors (Lee et al., 2014; Bennett, 2015; Bae, 2021).

H3: Empathy positively influences intention to help.

Cause involvement has received growing attention in research on the relationship between consumers and social or charitable initiatives undertaken by companies (Grau and Folse, 2007). It is defined as ‘the degree to which consumers find a cause to be personally relevant to them’ (Kim, 2014). Social marketing campaigns that draw on a cause perceived as meaningful to consumers tend to generate greater attention and increased engagement (Kim, 2014).

According to the Elaboration Likelihood Model (ELM), one of the main factors influencing the depth of processing of a message is the individual's level of personal involvement with the message or the object it presents (Petty et al., 1983). People who are highly involved are more inclined to process the message, i.e. to treat it in a more thoughtful and thorough manner, by mobilizing more complex cognitive processes (Petty et al., 1983). In general, involvement refers to the personal relevance of a subject to an individual (Zaichkowsky, 1986), in other words, the extent to which the individual perceives that an issue or object may directly affect them (Dhanesh and Nekmat, 2019). Several empirical studies conducted in various fields have confirmed the decisive role of involvement in shaping attitudes and behaviors, such as those observed in the contexts of health communication (Xiang and Stanley, 2017) and charitable giving (Koschate-Fischer et al., 2012; Kim, 2014). When the public feels strongly concerned about an issue or cause, their motivation to act and actively engage in solving the problem tends to increase, which promotes proactive communicative behaviors (Kim and Grunig, 2011). In the specific context of charitable giving, Koschate-Fischer et al. (2012) showed that cause involvement moderates the relationship between donation amount and willingness to pay: the stronger the consumer's involvement, the greater the effect of donation amount on willingness to pay. Similarly, Kim (2014) observed that, in the context of a local act, attitude towards the campaign has a significant and positive effect on purchase intention only among individuals with a high level of cause involvement. Based on the literature presented above, the following hypothesis is formulated:

H4: Cause-involvement positively moderates the effect of empathy on intention to help.

Figure 1 presents the conceptual framework of the research.

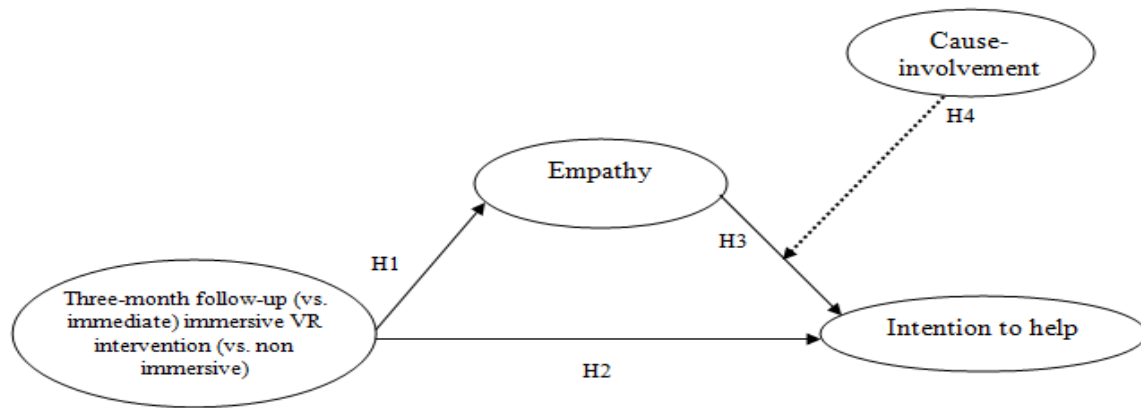


Figure1: Conceptual Model

3. METHODOLOGY

3.1 Design and procedure

The objective of this study was to examine the long-term (vs. short-term) effect of IVR on empathy and intention to help, while taking into account the moderating role of cause involvement. To achieve this objective, a 360° video was specially designed and produced for the purposes of this research. Designed to promote emotional immersion, it aimed to place the viewer in the shoes of a homeless person, in order to give them a more concrete and embodied sense of the daily reality of life on the streets. Filmed from a subjective (first-person) perspective, this video allowed participants to experience the typical and often challenging everyday situations that homeless people may face: waking up in a public space, interactions with passers-by that are sometimes distant, indifferent or hostile, searching for food or shelter, but also moments of kindness, humanity and solidarity.

The experiment was conducted in a laboratory with a sample of Tunisian students, recruited on a voluntary basis. Upon arrival, participants received a clear and detailed presentation of the general objectives and procedures of the experiment. Each participant then signed an informed consent form, in accordance with the ethical principles of psychological research, guaranteeing the confidentiality of data, the anonymity of responses and the freedom to withdraw from the study at any time, without justification or consequences. This procedure was designed to ensure voluntary and ethical participation. Participants were then randomly assigned to one of two experimental conditions using a computerized random number generator, ensuring independent assignment to each condition. Specifically, they were assigned either to (1) an immersive VR condition, in which the video was viewed using a VR headset, or to (2) a non-immersive VR condition, in which the same video was viewed on a computer screen. The experimental sessions were conducted individually to ensure homogeneous testing conditions. Participants were also informed that they could interrupt the session at any time if they experienced discomfort related to the use of the VR headset.

A post-test was administered immediately after viewing the video to assess the immediate effects of the experience on the two dependent variables: empathy and intention to help. A second assessment (empathy, intention to help, and cause involvement) was then conducted three months after the experiment to examine the persistence of the long-term effects of VR exposure. This time frame was chosen to allow for a more realistic assessment of the sustainability of emotional and

prosocial changes beyond the immediate reactions elicited by the experience (Immersive VR vs. non immersive VR).

3.2 Measures

Empathy was measured using a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree), consisting of 10 items adapted from the Interpersonal Reactivity Index (IRI; Davis, 1983), in the version adapted and validated by Bacca-Acosta et al. (2023). The scale comprises two dimensions: cognitive empathy (5 items) and emotional empathy (5 items). Intention to help was measured using eight items from the scale developed by Snow-Hill (2019) and adapted by Frechette et al. (2023). The items focused on various prosocial behaviors that individuals could adopt to help homeless people (e.g., *Give money to a homeless person*, *Make a donation to an organization that helps the homeless*). Participants indicated their level of agreement with each statement on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). An overall average score was calculated, representing each participant's level of intention to help. *Cause-involvement* was measured using a four-item bipolar scale developed by Grau and Folse (2007) and adapted by Koschate-Fischer et al. (2012). This scale assesses the level of personal importance and emotional resonance that participants attribute to the cause presented.

4. RESULTS

4.1 Demographic profile

A total of 156 students participated in the study. However, two participants discontinued their participation due to discomfort associated with the use of VR headsets, and another did not complete the final assessment, administered three months after the experiment. The final sample therefore consisted of 153 participants who completed the entire protocol.

The demographic characteristics (Table 1) of these participants indicate an average age of 26.67 years, with a balanced distribution between women (51.6%) and men (48.4%). In terms of educational background, the majority of participants were enrolled in bachelor's degree programmes (38.5%), followed by master's students (32.7%) and doctoral students (28.8%). This diversity of academic profiles provides a varied representation of the student population while ensuring good socio-cultural homogeneity.

Table 1: Demographic characteristics

		Frequency	Percentage
Gender	Woman	79	51.6
	Men	74	48.4
Education level	Bachelor's degree	59	38.5
	Master's degree	50	32.7
	Doctoral degree	44	28.8
Age	Mean	26.67	Range
			4years

4.2 Psychometric analyses

The psychometric reliability and validity of the measurement instruments used in this research were rigorously evaluated using a combination of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The results of these analyses, presented in Table 2, indicate that all scales

show good internal reliability, with Cronbach's alpha coefficients and composite reliability (CR) indices above the threshold of 0.60, in accordance with the recommendations of Hair et al. (2010). Convergent validity was also confirmed, with mean extracted variance (AVE) values consistently exceeding the criterion of 0.50 proposed by Fornell and Larcker (1981). Overall, these results attest to the psychometric robustness of the instruments used, guaranteeing the reliability of the measurements and their suitability for subsequent statistical analysis, thereby reinforcing the credibility of the conclusions drawn from this research.

Table 2: Results of exploratory and confirmatory factorial analyses

Items	Cronbach alpha	Composite reliability	AVE
Empathy	0.936	0.946	0.639
<i>Cognitive empathy</i>	0.882	0.901	0.645
<i>Emotional empathy</i>	0.876	0.896	0.633
Intention to help	0.921	0.933	0.638
Cause involvement	0.903	0.922	0.746

4.3 Hypotheses testing

To test research hypotheses H1 and H2, two mixed analyses of variance (repeated measures ANOVA) were performed. The type of VR exposure (non-immersive vs. immersive), coded as 0 and 1 respectively, was introduced as an between-subjects factor, while the measurement time (immediately after exposure vs. three months later) was considered an within-subjects factor. This analytical approach made it possible to examine both the main effects of immersion and time, as well as their interaction, in order to assess the changes in empathy and intention to help over time according to the type of experience.

The results of the first analysis ANOVA (Table 3) revealed a significant main effect of exposure to VR (Non-immersive vs. immersive), indicating that participants who exposed to immersive VR reported significantly higher levels of empathy than those exposed to the non-immersive version ($M_{Immersive\ VR} = 4.46$ vs. $M_{Non-immersive\ VR} = 3.43$; $F = 26.723$, $p < 0.001$, $\eta^2 = 0.150$). A main effect of time was also observed, reflecting a general decrease in empathy three months after exposure, compared to measurements taken immediately after exposure ($M_{Three-months\ later} = 3.71$ vs. $M_{Immediately} = 4.22$; $F = 49.145$, $p < 0.001$, $\eta^2 = 0.246$). Furthermore, a significant interaction between the type of exposure (immersive vs. non-immersive) and the measurement time (immediately vs. three months later) was observed ($F = 11.738$, $p < 0.01$, $\eta^2 = 0.072$). To examine this interaction more closely, paired t-tests were performed separately for each group. The results, presented in Table 3, show that a significant decrease in empathy between the two measurement times (immediately vs. three months later) was observed only in participants exposed to non-immersive VR ($M_{Immediately\ after\ non-immersive\ VR} = 3.86$ vs. $M_{Three-months\ after\ non-immersive\ VR} = 3.09$, $t = 3.995$, $p < 0.001$), while no significant change was found in the group that experienced immersive VR ($t = 1.249$, $p > 0.05$). Despite the slight decline observed in the immersive condition, the level of empathy measured three months later remains higher than that observed in the non-immersive condition at the same time period, supporting hypothesis H1. These results suggest that the immersive experience not only helps to strengthen empathy in the short term, but also maintains this effect in the long term, whereas exposure to a non-immersive version seems to have a more transient impact on the empathic response.

The results of the second analysis ANOVA (Table 3) revealed a significant main effect of exposure to VR (Non-immersive vs. immersive), indicating that participants who exposed to immersive VR

reported significantly higher levels of intention to help than those exposed to the non-immersive version ($M_{Immersive\ VR} = 3.70$ vs. $M_{Non-immersive\ VR} = 3.12$; $F = 12.804$, $p < 0.001$, $\eta^2 = 0.078$). However, no main effect of time was observed on the intention to help ($F = 1.829$, $p > 0.05$, $\eta^2 = 0.012$), suggesting that intention levels remained stable between the immediate measurement and the measurement taken three months after exposure. Furthermore, the interaction between exposure type (immersive vs. non-immersive) and measurement time (immediately after vs. three months later) was not significant ($F = 0.150$, $p > .05$, $\eta^2 = 0.001$). In other words, although immersive VR elicited a higher intention to help, the temporal effect of this variable was similar in both groups. These results suggest that the effect of immersion on helping intention does not vary significantly over time. Therefore, hypothesis H2 was not supported.

Table 3: Results of mixed-ANOVA analyses and paired samples t-test

Mixed ANOVA										
			Dependent variables							
			Empathy				Intention to help			
			M	F	p	Eta ²	M	F	p	Eta ²
Exposure to VR	Non-immersive (N=77)		3.43	26.723	0.000	0.150	3.12	12.804	0.000	0.078
	Immersive (N=76)		4.46				3.70			
Time	Immediately		4.22	49.145	0.000	0.246	3.49	1.829	0.178	0.012
	Three-months later		3.71				3.33			
Exposure to VR * Time	Immediately	Non-immersive	3.86	11.738	0.001	0.072	3.18	0.150	0.699	0.001
		Immersive	4.59				3.80			
	Three-months later	Non-immersive	3.09				3.06			
		Immersive	4.33				3.59			
Paired samples t-test										
					Empathy					
Exposure	Time		M		T		P			
Non-immersive (n=77)	Immediately		3.86		3.995		0.000			
	Three-months later		3.09							
Immersive (n=76)	Immediately		4.59		1.249		0.214			
	Three-months later		4.33							

For testing the other research hypotheses (H3 and H4), a moderated mediation analysis was conducted using the PROCESS macro (model 14), with 5,000 bootstraps. This analysis allows us to examine simultaneously the mediating effect of empathy and the moderating effect of cause involvement in the relationship between immersive VR (vs. non-immersive) and intention to help. The results, presented in Figure 2, show that the long-term effect of exposure to immersive VR, compared to non-immersive VR, on empathy is positive and significant ($\beta = 0.38$; $p < 0.001$, 95%CI = 0.29; 0.47). These results confirm that the immersive experience promotes a higher level of empathy in the long term than that generated by non-immersive VR. In turn, this increased empathy has a positive influence on intention to help ($\beta = 0.24$; $p < 0.001$, 95%CI = 0.17; 0.31), thus supporting hypothesis H3. However, the direct long-term effect of immersive VR (vs. non-immersive) on intention to help is not significant ($\beta = 0.04$; $p > 0.05$, 95%CI = -0.08; 0.16), while the indirect long-term effect via empathy is significant only for individuals with a high level of cause involvement ($\beta = 0.17$; $p < 0.01$, 95%CI = 0.07; 0.27). These results therefore suggest that empathy fully mediates the relationship between immersive VR and long-term helping intention. Furthermore, the analyses highlight a positive and significant interaction between empathy and

cause involvement ($M*W = 0.14$; $p < 0.05$, 95%CI = 0.05; 0.23). In other words, cause involvement plays a moderating role by amplifying the effect of empathy on the intention to help: the more individuals feel concerned by the cause, the stronger the impact of their empathy on their intention to help. These results thus support hypothesis H4.

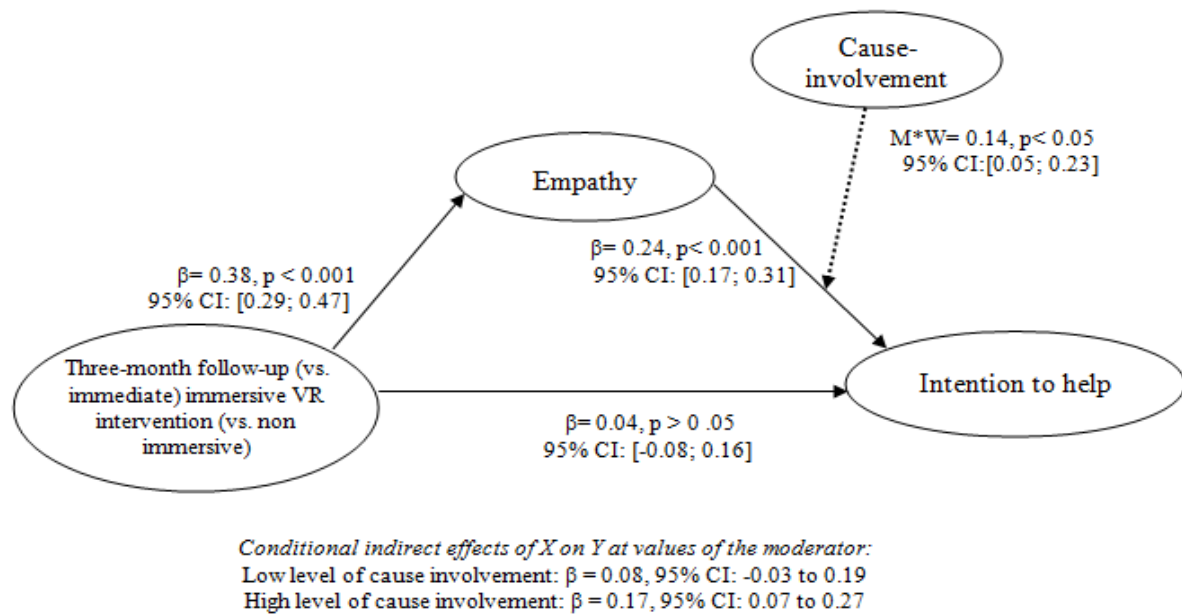


Figure 2: Moderated mediation analysis

5. DISCUSSION

The results of this research show that the long-term effect of immersive VR on empathy is greater than that produced by non-immersive VR. This finding supports and reinforces the work of Cohen et al. (2021) and Han et al. (2022), who highlight the potential of immersive VR to intensify empathic responses. These results therefore support the idea that the increased immersion offered by VR promotes deeper processing of emotional stimuli, thus facilitating projection into the situation experienced by others. The results of this study are also consistent with those of Huang et al. (2025), who showed that certain positive emotional effects can persist for several weeks after exposure, as well as those of Lukander et al. (2025), who found that immersive exposure promotes lasting retention of learning and behavior. However, the results of this study reveal no significant difference between the long-term effect of immersive VR and that of non-immersive VR on intention to help. In other words, although participants exposed to immersive VR show slightly higher levels of intention to help than those exposed to non-immersive VR, the temporal trajectory of this intention remains comparable between the two experimental conditions. This lack of differential effect suggests that increased immersion does not confer any lasting advantage in terms of maintaining prosocial intentions. Several factors may explain this result. On the one hand, it is possible that the intention to help, as a self-reported variable, is less sensitive to variations in the degree of immersion than more directly affective measures, such as empathy. Participants may thus perceive and evaluate their intention to help according to relatively stable social or moral standards, independently of the nature of the immersive experience. On the other hand, the initial effect of immersive VR on prosocial motivation may fade over time in the absence of contextual reinforcement or concrete opportunities to translate this intention into actual behavior. In the absence of repeated exposure or experiential recall, the emotion elicited by immersion tends to dissipate, returning intention levels to their baseline state. These observations are consistent with the findings of Huang and Yang (2022) and Huang et al. (2025), who showed that the positive

effects of immersive VR, although intense in the short term, tend to gradually diminish in the absence of repeated stimulation. Nevertheless, these results contrast with those of Lukander et al. (2025), whose work has shown that immersive VR can produce lasting effects on behavior, particularly in the context of workplace safety training. This divergence could be explained by the nature of the experimental context: while training involves concrete and repetitive learning processes, the intention to help is more a matter of socio-affective dispositions, which are more volatile and dependent on the immediate context of the experience. Furthermore, the lack of a significant difference between the long-term effect of immersive VR and non-immersive VR on intention to help can also be explained by the level of cause involvement, which could play a decisive role in the stability of this intention. Indeed, if participants do not feel personally concerned or strongly involved in the cause presented, the impact of immersion on their intention to help remains limited. Conversely, strong involvement in the cause could amplify the effect of immersive VR by promoting deeper identification and more lasting prosocial motivation.

The results of this research also show that empathy has a positive and significant influence on intention to help. In other words, the more empathy individuals feel towards others, the more inclined they are to adopt prosocial behaviors and engage in helping actions. These results are consistent with the existing literature. Indeed, several authors have highlighted the central role of empathic emotions in the genesis of helping behaviors. For example, Lee et al. (2014) showed that emotional empathy increases the likelihood of adopting altruistic behaviors by promoting identification with and understanding of others' needs. Similarly, Bennett (2015) emphasized that the ability to feel the emotions of others is a key determinant of prosocial responses, as it activates mechanisms of empathic concern that motivate action. Finally, Bae (2021) confirmed that empathy acts as a psychological mediator between exposure to emotional stimuli and the intention to help, thereby reinforcing the link between emotional experience and socially oriented behavior.

Finally, the results of this study show that cause-involvement positively moderates the relationship between empathy and intention to help. In other words, the effect of empathy on the willingness to act in favor of others is stronger when individuals feel concerned or personally involved in the cause. This finding highlights the amplifying role of cause involvement, which strengthens the link between emotional resonance and its behavioral translation. These results are consistent with previous research that has emphasized the importance of personal involvement in activating prosocial behaviors. For example, Koschate-Fischer et al. (2012) demonstrated, in the context of charitable donations, that cause-involvement moderates the relationship between donation amount and willingness to pay: the more involved the consumer feels, the more willing they are to contribute financially. This study illustrates the fact that psychological attachment to a cause intensifies the effect of emotional and motivational factors on prosocial decisions. Similarly, Kim (2014) observed that, in the context of local action, a positive attitude towards a campaign only has a significant effect on purchase intention among individuals who are strongly involved in the cause being promoted. These results suggest that personal involvement acts as a filter or catalyst, conditioning the impact of emotions and attitudes on behavioral intentions. The results of this study extend these studies by demonstrating that this moderating role of involvement also applies to the context of helping behaviors induced by immersive experiences. Empathy alone, although essential, is not always enough to trigger a lasting intention to help; it must be accompanied by a sense of closeness and personal relevance to the cause. The more individuals feel involved in the cause presented, the more their empathetic emotions translate into a motivation to take concrete action.

6. CONCLUSION

The results of this study offer new insights into understanding the psychological mechanisms underlying the effectiveness of immersive VR in the field of charitable giving. On a theoretical level, this study makes a significant contribution to the literature on immersive VR by demonstrating its potential to generate lasting prosocial engagement. It stands out for its originality, being one of the first studies to examine the long-term effects of immersive VR in the context of charitable giving. Contrary to previous studies (Cohen et al., 2021; Han et al., 2022; Frechette et al., 2023; Rodrigues et al., 2023; Nouri et al., 2025), which focus principally on immediate effects, this study adopts a longitudinal approach, assessing impacts immediately after exposure and then three months later, in order to better understand the sustainability of the observed effects. To the best of our knowledge, this is one of the first attempts to directly link immersive VR to the sustainability of prosocial intentions in the context of charitable giving, offering new insights into the mechanisms that maintain prosocial motivation over the long term. Furthermore, the results indicate that the direct long-term effect of immersive VR, compared to non-immersive VR, on helping intention is not significant and is entirely mediated by empathy. In other words, it is the empathic processes, both cognitive and emotional, activated by the immersive experience that are the real drivers of prosocial engagement. This suggests that the lasting impact of immersive VR does not depend simply on technological exposure, but on its ability to elicit emotional identification and a deep understanding of the beneficiaries' situation. In practice, to maximize the effectiveness of VR-based interventions, it is therefore essential to design experiences that promote empathy and cognitive involvement, rather than focusing only on sensory quality or the degree of technical immersion. The study also makes an important conceptual advance by incorporating cause involvement as a moderating factor. The results show that cause involvement amplifies the effect of empathy on intention to help, providing a better understanding of the conditions under which empathic emotions translate into prosocial behavior. Thus, the effectiveness of immersive interventions depends not only on the generation of empathy, but also on the level of personal involvement of participants, which partly explains the variability of long-term responses. In short, this study enriches the theoretical literature by demonstrating that immersive VR acts as a psychological catalyst, capable of mobilizing cognitive and affective processes to promote lasting prosocial engagement, and that the combination of empathy and cause involvement is crucial for transforming the immersive experience into concrete and lasting intentions to help. These insights provide a solid basis for the development of conceptual models that integrate both emotional and motivational dimensions in the study of immersive VR applied to prosocial behavior.

The results of this study also offer several managerial and practical insights for organizations, NGOs and companies wishing to use immersive VR to stimulate prosocial engagement and encourage donations. First, immersive VR can be used to increase empathy for a cause by creating immersive and interactive narrative scenarios in which participants actively project themselves into the experience of beneficiaries, such as homeless people. The goal is to maximize emotional resonance and foster a personal connection with the cause, as empathy is the main driver of long-term intention to help. Well-designed experiences allow participants to feel the challenges and needs of homeless people in a concrete way, strengthening their prosocial motivation. Second, the results show that the effectiveness of empathy in generating an intention to help depends strongly on the level of involvement with the cause (cause involvement). Campaigns should therefore target both cognitive and affective empathy, for example by providing personalized information, allowing direct interaction with the cause, or involving participants in concrete actions. This approach promotes the transformation of empathic emotions into effective and lasting prosocial behaviors, while consolidating a deeper engagement with the cause. Given that the direct effects of immersive

VR on people's intention to help may diminish over time, it is therefore recommended to offer repeated immersive experiences. Integrating reminders, updated content or new perspectives into the experience helps to reinforce emotional engagement and maintain prosocial motivation over the long term, thereby limiting the natural decline in emotional effects. Furthermore, the results show that individuals who are strongly involved in the cause benefit more from immersive experiences. It is therefore crucial to identify these segments and design strategies tailored to different levels of involvement. For example, highly involved participants can benefit from more in-depth and interactive experiences, while those who are less involved can be gradually guided towards greater identification with the cause through targeted content or participatory activities. Such segmentation maximizes the overall impact of campaigns and optimizes the conversion of empathetic emotions into prosocial behaviors, while ensuring the efficient allocation of resources. Beyond the strictly charitable context, these insights can also guide the design of training, social awareness or corporate social responsibility (CSR) communication programs, simultaneously mobilizing emotional and motivational processes to generate sustainable prosocial behaviors. In summary, this study demonstrates that immersive VR acts as a powerful psychological catalyst, whose effectiveness lies not only in the technology itself, but in its ability to activate empathy and strengthen engagement to the cause. These results thus offer concrete insights for practitioners wishing to design immersive interventions capable of maximizing prosocial engagement and generating a lasting impact, while highlighting the importance of a strategic and personalized approach based on the profile and level of involvement of participants.

Although this study makes important contributions to understanding the long-term effects of immersive VR on empathy and intention to help, it has several limitations that open the way for future research. Firstly, the composition of the sample, consisting exclusively of students, may limit the generalizability of the results. Future research would benefit from diversifying participant profiles, taking into account cultural, socio-economic, and generational differences, in order to examine the robustness of the effects observed in various contexts. Secondly, this study relies on self-reported measures of empathy and intention to help, which may be influenced by social desirability bias (Beattie and McGuire, 2012). The integration of objective behavioral measures (e.g., effective follow-up of donations, volunteer work or repeated engagements) and physiological measures (such as cardiac responses) would complement the assessment and strengthen the validity of the conclusions regarding the impact of immersive VR. Thirdly, although the study adopted a longitudinal approach, the follow-up period—limited to three months—remains relatively short to assess the true persistence of the effects. Future work could consider longer time frames or examine the dynamics of emotional decline following multiple exposures in order to identify the optimal conditions for maintaining prosocial engagement. Finally, this research focused on a single specific cause (homelessness), which limits the scope of the findings. It would therefore be relevant to broaden the analysis to different types of causes—humanitarian, environmental, health, or educational—in order to identify the contexts in which immersive VR is most effective in eliciting empathy and promoting sustainable prosocial behavior.

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