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## Virtual reality and charitable giving – the role of space, presence, and attention

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**Virtual reality and charitable giving — the role of space, presence, and attention**

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### **Abstract**

Virtual Reality (VR) is a promising tool for nudging charitable attitudes and behavior. Still, how VR experiences are processed by users remains unclear. To ensure the future success of VR storytelling, therefore, it is critical to understand how users experience a VR story overall, and what the potential antecedents and consequences associated with it are. In this study, we address the gaps in the literature by comparing the spatial presence, attention allocation, spatial situation model, empathy, and donation behavior after viewing content using VR vs. a desktop computer. Results point to a clear phenomenological distinction between experiencing the content in these two mediums. Specifically, the VR group exhibited significantly higher spatial presence, attention allocation, spatial situation model, and empathy. Donation behavior, though, was equal. The study has implications for the theoretical knowledge of VR and charitable giving, as well as the Construal Level Theory of psychological distance. They are also helpful for businesses wishing to use VR in their marketing strategies.

**Keywords:** virtual reality, charitable giving, empathy, spatial presence, attention allocation, spatial situation model

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## 1. Introduction

Virtual Reality (VR) is a promising tool that delivers a memorable experience. In this experience, users use various gadgets to explore a virtual environment while remaining present in their own physical space (Lessick & Kraft, 2017; Van Kerrebroeck et al., 2017). Recently, governmental bodies and non-profit organizations have recognized the persuasive power of VR and started to use VR storytelling to raise awareness and money to mitigate social issues such as poverty, hunger, and inequality (Nelson et al., 2020). Wars, diseases, and natural disasters ravaging the world highlight the importance of finding novel ways for increasing donations (Gugenishvili, 2022). Still, despite some scholarly interest, there is currently very little theoretical knowledge on VR and charitable giving. Subsequently, how VR affects people's charitable attitudes and behaviors is yet to be discovered and clarified (Bujic et al., 2020).

The advantage of VR, over any other medium, is its ability to completely isolate users from the real world, essentially allowing them to step into the scene and make them feel as if they were a part of the narrative (Bogicevic et al., 2019; Shin, 2018). It is possible that in such conditions users will be better able to empathize with individuals depicted in the VR content. Thus, this technology could hold the potential for making people care about disadvantaged and vulnerable groups including homeless people, refugees, and those with physical and mental disabilities (Shin, 2018).

Despite the great expectations and popularity of this technology, further research to understand consumer behavior in the VR context is needed (Hudson et al., 2019). It is still unclear whether users feel present during experiencing VR content. Some studies support this notion (e.g., Ma et al., 2021) but others argue that feeling present depends on individual characteristics and intentions (Kober & Neuper, 2013; Shin, 2018). Moreover, even though Wirth et al. (2007) suggest spatial presence as the outcome of attention allocation and spatial situation model, the research on these concepts is limited and inconclusive. For instance, Li et al. (2020) found that VR increases attention allocation, while Barbosa et al. (2019) concluded it does not. In addition, it remains unclear how VR experiences are processed by users (Shin, 2018). For example, whether presence leads to prosocial outcomes, such as empathy and donations, is shrouded in mystery. There are only a few studies that have compared the invocation of empathy in VR and other technological mediums (Kahn & Cargile, 2021) and they provide inconsistent results (e.g., Sundar et al., 2017; Tong et al., 2017). To ensure a successful rollout of VR storytelling, therefore, it is critical to understand how users experience a VR story overall, what influences these experiences, and what are the outcomes in the forms of feelings, attitudes, and behaviors (Shin, 2018).

In this study, we address these research gaps by comparing the presence and prosocial outcomes in a controlled experiment. The test persons ( $n = 100$ ) were divided into two groups, of which one group is asked to view content using VR and the other group is asked to view the content using a desktop computer. Our results show that users feel more empathetic towards the protagonist in a VR story (in our case the victim of war) when viewing the content in VR compared to a desktop computer. However, our study did not indicate that VR motivates users' prosocial behavior, i.e., to make actual donations, more effectively than consuming content on a desktop computer.

The article is organized as follows. First, the theoretical background is elaborated, based on which we develop hypotheses for this study. Second, we describe the details of how the controlled experiment was conducted and how the data was analyzed. Third, the paper concludes with a general discussion of how our

results relate to previous literature, the contributions and limitations of the study, and suggestions for future research.

## 2. Theoretical background and hypotheses development

Interest in how VR might transform the realm of fundraising increases as more and more non-profit and governmental entities start using it for raising awareness on social issues. With wearable devices, VR obscures sensory input from the real world, essentially locking the users out of the physical environment (Bogicevic et al., 2019; Fuchs et al., 2011), and immersing them in a 3D virtual world (Bonetti et al., 2018; Dad et al., 2016). Immersion is characterized by deep physical and mental involvement in the present place and moment. Achieving it requires three conditions; first, content must provide a near real-time connection between a user's actions and their sensations; second, visuals and audios in VR need to be as similar as possible to real; third, elements of the virtual world should be responsive to the user actions (Slater, 2009; Slater et al., 2009). When these conditions are present, users lose the overview of how technology might give them the impression that they are in surroundings that are distinct from their physical world (Carù & Cova, 2006; Hansen & Mossberg, 2017). The experimental counterpart of immersion is spatial presence (Wirth et al., 2007), which refers to being present or "being there" in a technology-facilitated environment (Bogicevic et al., 2019; Slater et al., 2009). There are similarities between presence and immersion. However, presence is the psychological, perceptual, and cognitive result of immersion, whereas immersion is a feature of technology (Slater & Wilbur, 1997). The bottom line is that both of these terms describe an experience in which the boundaries between reality and imagination are fuzzy (Shin, 2018).

In their study of nursing students, Ma et al. (2021) demonstrated that playing (the game) in VR leads to a greater spatial presence than playing using some other technology. Still, some researchers suggest that immersion and consequently spatial presence are not entirely the result of VR. These researchers argue that spatial presence might depend on individual characteristics and intentions. For instance, Kober and Neuper (2013) found that presence correlates with mental imagination and immersive tendencies. Shin (2018) also concluded that how strongly users immerse in VR depends on their intentions of immersing in it, rather than on technological features. Thus, some controversy exists on whether VR can lead to spatial presence, or whether it is so that spatial presence depends on the users themselves. Still, VR, unlike other mediums, can meet all the above-mentioned conditions for immersion and simultaneously address several sensory channels (Biocca, 1997; Wirth et al., 2007). Specifically, when using VR devices, the user is cut off from the outside world; users move and turn their heads, but they still see and hear the environment as it is depicted by the technology. Contrarily, while reading a book or watching a film, eyes, and ears continuously confirm to individuals that they are in the real world, not in the narrative (Slater & Sanchez-Vives, 2016; Studt, 2021). Based on this argumentation, we hypothesize that spatial presence is more profound when using VR compared to when using any other medium, which in this study is a desktop computer.

**H1:** Participants exposed to content via VR are more likely to perceive the spatial presence within the virtual environment than the ones exposed to the same content via desktop computer.

If spatial presence is indeed facilitated by VR, it is important to understand what the possible antecedents and consequences of this process are. In their model of spatial presence formation, Wirth et al. (2007b) proposed attention allocation as one of the main facilitators of spatial presence. Attention allocation is a devotion of mental resources to the media, which might happen voluntarily or involuntarily. Voluntary attention allocation

takes place when users choose to pay attention as they think the media is fascinating. Involuntary attention allocation might occur if media offers features that match users' needs and/ or interests. Attention allocation can be short or long, and media factors influence the length. Which these factors might be in the VR context is yet to be determined, but the underlying premise is that attention allocation is proportional to the number of sensory channels the medium can engage, which is high in VR (Wirth et al., 2007). To check the phenomenon in empirical settings, Barbosa et al. (2019) administered pleasant, unpleasant, and neutral visual-emotional stimuli via a computer screen as opposed to VR to 31 participants. The findings showed that the computer screen was equally as good at drawing attention to stimuli as VR, and this effect was consistently shown in all emotional contexts. Contrarily, Li et al. (2020) concluded that VR might be more efficient in claiming attention than 2D screens, such as desktop, laptop, and tablet devices. When attention allocation is long enough, and based on Wirth et al.'s (2007) argumentation we believe it should be longer in VR compared to desktop computers, as users build a spatial situation model. The spatial situation model represents the second essential element for spatial presence formation and is the measure of the extent to which users can visualize the spatial relations within the virtual world (Coxon et al., 2016). Even though spatial situation model is a crucial part of evaluating media efficacy (Klippel et al., 2019), there is not much research done on it in the context of VR. Thus, our H3 is mainly based on the idea that attention allocation and spatial situation model positively correlate with each other.

**H2:** Participants exposed to content via VR will exhibit higher attention allocation to the virtual environment than the ones exposed to the same content via desktop computer.

**H3:** Participants exposed to content via VR are more likely to form a higher spatial situation model of the virtual environment than the ones exposed to the same content via desktop computer.

Past research has found that spatial presence can enhance the emotional impact of media, such as pleasure (e.g., while playing a video game) (e.g., Klimmt & Vorderer, 2003; Tamborini & Skalski, 2006). Similarly, Shin (2018) and Raney et al. (2019) state that VR can offer opportunities for people to experience positive emotions, such as empathy. Empathy represents an emotion triggered by and consistent with the well-being of a perceived underdog (Batson, 2011; Gugenishvili, 2022). Two types of empathy exist, namely dispositional empathy, which is the individual characteristic, and situational empathy, which is the situational condition (Muller et al., 2017). In this study, we focus on the latter. The idea that spatial presence might enhance empathy can be further supported by the Construal Level Theory (CLT) of psychological distance (Trope & Liberman, 2010). Based on the basic tenets of CLT, we believe VR will reduce the perceived psychological distance to the object or situation calling for an emotional response—in this case, empathy—and behavior—in this case, charitable giving. In particular, VR should reduce perceived hypothetical, spatial, and social distance, and hence cause the object or situation to be mentally construed in a less abstract, more concrete, and contextualized manner (Wiesenfeld et al., 2017). That is, VR should cause users to feel less abstract, less hypothetical, and less spatially and socially distant. When this happens it diminishes the mental separation between the self and the others, effectively enabling individuals to take others' perspectives (Behm-Morawitz et al., 2016). For example, Chen et al. (2021) tested the effect of perspective-taking via embodiment in VR and showed that the embodiment of an ethnic minority improves attitudes toward minority groups. Similarly, Penn et al. (2010) and Formosa et al. (2018) found that when exposed to schizophrenia symptoms in VR, participants exhibited higher empathy, compared to pre-exposure and theory-based learning conditions. Moreover, Sundar et al., (2017), and Schutte and Stilić (2017) concluded that experiencing the content in VR as opposed to other mediums leads to greater empathy.

Still, other studies provide contradicting evidence. Oh et al. (2016) and Tong et al. (2017), for example, demonstrated that VR was unsuccessful in enhancing empathetic concerns toward old people or people with chronic pain.

There is strong empirical support for the idea that empathy relates to prosocial actions, including helping, sharing, and cooperating (e.g. Davidov et al., 2016; Decety & Jackson, 2004; Eisenberg et al., 2010). The impact of empathy on charitable giving has also been investigated by numerous scholars (e.g. Bekkers & Ottoni-Wilhelm, 2016). However, the literature is inconclusive. Some scholars argue that individual differences in empathy translate into a variation in charitable giving (e.g. Sze et al., 2012; Verhaert & Van den Poel, 2011). Others, on the other hand, point out that the relationship between empathy and charitable giving does not always exist. These researchers highlight the importance of various factors, such as gender and guilt (e.g. Mesch et al., 2011; Roberts et al., 2014). Kahn and Cargile (2021) investigated prosocial attitudes and outcomes in the VR context and found that the presence of awe does not guarantee prosocial behavior. Similarly, in their quasi-experiment Radu et al. (2021) found that VR exposure increased empathy and willingness to donate to help children experiencing issues in early literacy. Still, this was not the case for everyone as participants who were experienced in teaching or had lower starting scores of empathy were less likely to be affected by the VR content.

Even so, considering the CLT of psychological distance, we believe the power of VR as opposed to desktop computers is stronger in increasing empathy and prosocial behavior, in this case, donation.

**H4:** Participants exposed to content via VR will exhibit higher empathy towards victims than the ones exposed to the same content via desktop computer.

**H5:** Participants exposed to content via VR will exhibit higher donation behavior towards victims than the ones exposed to the same content via desktop computer.

### **3. Method**

To answer the research question and test the hypotheses a controlled experiment was conducted.

#### **3.1. Participants and Procedure**

The experiment was carried out at a university's premises in South-West Finland (Åbo Akademi University, ÅAU). The sample mostly consisted of students and employees of the university. The pre-established experimental protocol was followed throughout the experiment (see Appendix 1). According to this protocol, each participant was instructed before the experiment. These instructions were generic for everyone and general enough to avoid the disclosure of the true essence of the study. After giving instructions, calibrations of the VR glasses (in group 1) were conducted. This was followed by watching the video in VR (Oculus Quest 2) or 2D (27" Lenovo Desktop PC screen). The video used is a short documentary named "The Displaced" produced by the New York Times. It illustrates the global refugee crises by telling the real stories of three children from South Sudan, Ukraine, and Lebanon, who were all displaced by war. Figure 1 shows the thumbnail of the movie. The movie grounds users in a specific situation of these children's lives. After watching the video, participants were asked to fill in the questionnaire, which was built using an online survey tool (SurveyMonkey). At the end of the study, the questionnaire disclosed pertinent information about the true nature and objectives of the study. Participants were then allowed to either withdraw their responses or to give informed consent for analyzing their data and using it for scientific publications.

**Figure 1**

*"The Displaced" by the New York Times*



### **3.2. Measures and Variables' Operationalization**

Adopted from the existing literature, the language of the measurement items was amended to make them relevant for the context of the current study: spatial presence (Vorderer et al., 2004), attention allocation (Vorderer et al., 2004), spatial situation model (Vorderer et al., 2004) and empathy (Lee et al., 2014). Items of the variables are listed in Table 1. A 7-point Likert scale was used to assess all the above-mentioned items (i.e., 1-strongly disagree, 7- strongly agree). Averaging the values of multi-item constructs yielded the composite scores. Finally, participants were asked for a partial or full donation of the bonus voucher that five randomly chosen participants would win:

*"You are now done with the first part of this study. Thank you for your participation!*

*As a 'Thank You' we will give a bonus voucher of €50 to five randomly chosen participants. Each participant regardless of their answers has an equal chance of winning the bonus.*

*You can keep the voucher for yourself or donate all or part of it to one of our partner child protection charitable organizations or an organization of your own choice. If you were to win, would you like to donate?*

*Please specify your preferences regarding the amount and/ or charitable organization below".*

## **4. Results**

### **4.1. Data Screening and Assumptions Testing**

We began the assumptions testing by assessing the study design: (a) five continuous dependent variables were used (empathy, donation behavior, attention allocation, spatial situation model, and spatial presence); (b) the independent variable used was categorical with two groups (Group 1: VR; Group 2: 2D); and (c) observations were independent of each other. Next, the rest of the assumptions were tested using IBM SPSS Statistics 27. Seven outliers had been discovered, as assessed by inspection of a boxplot for values greater than 1.5 box lengths from the edge of the box. Close inspection of the respondents and their responses identified no errors related to data entry or measurement. Therefore, we deemed these points as natural variations and they were thus kept for further analysis. Some of the residuals were not normally distributed, as assessed by Shapiro-



Wilk's test. Because the independent-samples t-test is robust to deviations from normality and sample sizes were nearly equal (Glass et al., 1972; Mardia, 1971), we decided to carry on with the analysis. Levene's test for equality of variances revealed that the variances for empathy for VR and desktop computer groups were homogeneous ( $p = .544$ ), and correspondingly for attention allocation ( $p = .08$ ), spatial situation model ( $p = .922$ ), and spatial presence ( $p = .5$ ). The assumption was however violated for donation behavior ( $p = .021$ ), which we take into consideration when reporting the statistical significance of the group differences in terms of this variable.

#### 4.2. Reliability of measurement scales

Cronbach's alphas ranged from 0.854 to 0.954 for all scales, revealing good validity for all constructs (as per Table 1 below). Table 1 provides detailed information about the measuring items.

**Table 1**

*Items measuring key constructs*

<b>Variables and items</b>	<b>Cronbach's <math>\alpha</math></b>	<b><math>\alpha</math> if the item deleted</b>	<b>M</b>	<b>SD</b>
<b><i>Attention allocation</i></b> (Vorderer et al., 2004)	.885			
I devoted my whole attention to the virtual environment.		.865	6.07	1.071
I concentrated on the virtual environment.		.866	6.21	.961
My attention was claimed by the virtual environment.		.86	5.97	1.12
I directed my attention to the virtual environment.		.878	6	1.161
The virtual environment captured my senses.		.885	5.77	1.185
I dedicated myself completely to the virtual environment.		.85	5.59	1.237
My perception focused on the virtual environment almost automatically.		.876	5.87	1.157
<b><i>Spatial situation model</i></b> (Vorderer et al., 2004)	.896			
I was able to imagine the arrangement of the spaces presented in the virtual environment very well.		.886	5.73	1.105
I had a precise idea of the spatial surroundings presented in the virtual environment.		.885	5.53	1.198
In my mind's eye, I was able to clearly see the arrangement of the objects presented.		.89	5.55	1.154
I was able to make a good estimate of the size of the presented space.		.88	5.47	1.28
I was able to make a good estimate of how far apart things were from each other.		.889	5.42	1.221
Even now, I still have a concrete mental image of the spatial environment.		.872	5.62	1.235
Even now, I could still draw a plan of the spatial environment in the presentation.		.885	4.8	1.27
Even now, I could still find my way around the spatial environment in the presentation.		.875	4.91	1.371
<b><i>Spatial presence</i></b> (Vorderer et al., 2004)	.954			
I had the feeling that I was in the middle of the action rather than merely observing.		.952	4.7	1.446
I felt like I was a part of the environment in the presentation.		.95	4.95	1.514

Variables and items	Cronbach's $\alpha$	$\alpha$ if the item deleted	M	SD
I felt like I was actually there in the environment of the presentation.		.945	4.64	1.522
I felt like the objects in the presentation surrounded me.		.951	5.04	1.678
It was as though my true location had shifted into the environment in the presentation.		.946	4.38	1.57
It seemed as though I was present in the environment of the presentation.		.944	4.39	1.615
I felt as though I was physically present in the environment of the presentation.		.945	4.2	1.603
It seemed as though I actually took part in the action of the presentation.		.948	4.04	1.525
<b>Empathy</b> (Lee et al., 2014)	.907			
<i>To what degree do you feel the following emotions toward the children in the video?</i>				
Sympathetic		.897	6.01	1.208
Warm		.883	5.4	1.382
Compassionate		.888	5.66	1.207
Softhearted		.88	5.5	1.306
Tender		.876	5.13	1.389
Moved		.916	5.66	1.413

#### 4.3. Descriptive Statistics

The sample comprised 100 students: 54% of which were female, and the mean age of the respondents was 26 (min. = 20; max. = 54; mode = 22; std. dev. = 6.546). Table 2 illustrates the descriptive statistics of measured variables.

**Table 2**

*Descriptive statistics of measured constructs*

	Spatial presence	Attention allocation	Spatial situation model	Empathy	Mean	Std. Dev.
<b>Spatial presence</b>	1.000				4.5457	1.3465
<b>Attention allocation</b>	.331**	1.000			5.9231	.8592
<b>Spatial situation model</b>	.517**	.414**	1.000		5.393	.9196
<b>Empathy</b>	.23*	.218**	.116	1.000	5.5859	1.1615

\*\* indicates that the correlation coefficient is significant at the 0.01 level (2-tailed).

\* indicates that the correlation coefficient is significant at the 0.05 level (2-tailed).

#### 4.4. Hypotheses testing

Results show a statistically significant difference in spatial presence scores between the two experimental groups, with participants who watched the content in VR scoring higher than the ones who watched it on a

desktop computer,  $M_{VR} = 5.1823$ ,  $M_{COMPUTER} = 3.9423$ ,  $M_{DIFFERENCE} = 1.24$ , 95% CI [.76, 1.72],  $t(98) = 5.141$ ,  $p < .001$ ,  $d = .73$ . Thus, we accept the alternative H1.

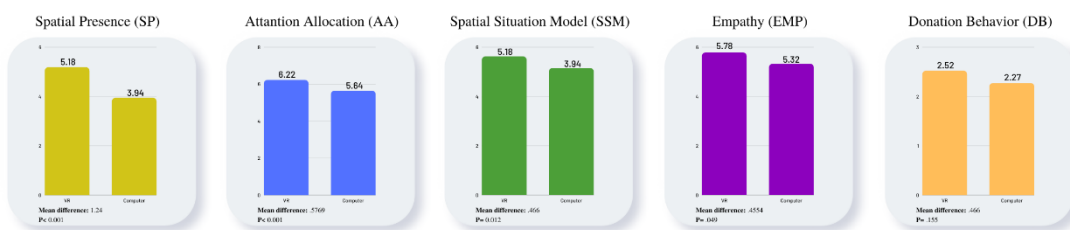
The group differences were also statistically significant in terms of attention allocation and spatial situation model,  $M_{VR} = 6.2143$ ,  $M_{COMPUTER} = 5.6374$ ,  $M_{DIFFERENCE} = .5769$ , 95% CI [.2483, .91],  $t(98) = 3.49$ ,  $p < .001$ ,  $d = .5$ , and  $M_{VR} = 5.6198$ ,  $M_{COMPUTER} = 5.1538$ ,  $M_{DIFFERENCE} = .466$ , 95% CI [.11, .83],  $t(98) = 2.567$ ,  $p = .012$ ,  $d = .37$ , respectively. Thus, we accept the alternatives H2 and H3.

Empathy scores between the two experimental groups, with participants who watched the content in VR scoring higher than the ones who watched it on a desktop computer,  $M_{VR} = 5.7778$ ,  $M_{COMPUTER} = 5.3224$ ,  $M_{DIFFERENCE} = .4554$ , 95% CI [.00, .91],  $t(98) = 1.99$ ,  $p = .049$ ,  $d = .28$ . Based on this we accept the alternative H4.

Finally, the difference in terms of donation behavior between the two experimental groups was not statistically significant,  $M_{VR} = 2.52$ ,  $M_{COMPUTER} = 2.27$ ,  $M_{DIFFERENCE} = .252$ , 95% CI [-.1, 0.602],  $t(97.841) = 1.432$ ,  $p = .155$ ,  $d = .2$ . Thus, we reject the alternative H5. Figure 2 visually illustrates the results.

**Figure 2**

*Visual illustration of the results*



## 5. Discussion and conclusions

Is storytelling via VR more successful in making users feel empathetic and motivating them to donate money than via desktop computers? Prior literature on this topic is limited and inconclusive (Kober & Neuper, 2013; Ma et al., 2021; Shin, 2018). Still, understanding how VR can be used in raising awareness on social issues and collecting donations is important as the popularity of this technology grows, and it becomes a potential tool for making people more prosocial. In this empirical study, we compared the effects of VR and desktop computer stimuli. Specifically, we hypothesized that watching content using VR as opposed to a desktop computer would generate higher spatial presence, attention allocation, spatial situation model, empathy, and donations. To test these hypotheses we conducted a between-subject experiment where 100 respondents watched the movie "The Displaced", produced by the New York Times, using a VR device or desktop computer screen.

Our research demonstrates a clear phenomenological distinction between experiencing the content in VR and desktop computer formats, with VR groups reporting significantly higher spatial presence, attention allocation, and spatial situation model. Thus, our study contributes to a further understanding of how users experience VR content and how it influences their perceptions of being present in a virtual scene. These results align with some previous studies (e.g., Li et al., 2020; Ma et al., 2021) but contradict some others (e.g., Barbosa et al., 2019). A potential explanation for this inconsistency could be the differences in sample and experimental

settings. Barbosa et al. (2019), for example, found that VR and desktop computers were equally successful in capturing attention but, unlike us, they only investigated male students.

Our results also confirm that when viewing the content in VR, users feel more empathetic toward the protagonist in the narrative, in our case the victims of war, than viewing the same content using a desktop computer. These results parallel the findings of several studies, including Schutte and Stilinović (2017) and Sundar et al. (2017b). This provides further support for the application of the CLT of psychological distance to the domain of VR. In other words, this technology likely reduces distance, ultimately triggering an emotional response to the context. Still, some researchers, such as Oh et al. (2016) and Tong et al. (2017), did not find that VR experiences increased empathetic concerns toward old people or people with chronic pain. According to the authors, the short duration of the intervention may have contributed to this lack of an effect.

Interestingly, even though participants felt more empathetic when watching the content in VR than on a desktop computer, there were no statistically significant differences between the two experimental groups in terms of donations. Our results do not provide evidence, therefore, that VR may motivate individuals to make actual donations more effectively in experimental settings than a desktop computer can. Similar to us, Radu et al. (2021) found that VR was not always successful in motivating individuals to donate. A small sample size could be the reason for these findings; Radu et al.'s (2021) sample only included 27 people, while ours 100.

The results of this study have significant implications for marketing, especially non-profit fundraising strategies. Specifically, our results show that VR is significantly more successful in leveraging empathy, and some of the potential reasons for it might be spatial presence. This is important as empathy often leads to actual prosocial behavior (e.g. Davidov et al., 2016; Eisenberg et al., 2010). Still, our study shows that feeling empathetic does not automatically generate donations. Thus, non-profit fundraising strategies should include other variables and features when creating VR content that could guarantee donations. One such feature could be the opportunity to embody the beneficiary, rather than passively observe. This is vital as individual donations represent a big share of charitable organizations' incomes (Gugenishvili et al., 2022).

The current study has several limitations due to its scope and exploratory character. First, due to a small sample size, we were unable to conduct the process analysis on the measured variables. Thus, even though group differences are statistically significant, we cannot confidently say that differences in empathy, for example, are caused by differences in terms of spatial presence. Moreover, we did not measure whether attention allocation was voluntary or involuntary. Measuring this could be helpful for a better understanding of the potential underlying reasons for VR being more successful in capturing attention; is it so that users perceive it more attractive and interesting to watch the content in VR, or are they simply fascinated by this novel technology, or are there any specific features, such as interactivity, that assures the attention is claimed? Furthermore, we theorized that CLT of psychological distance can explain the higher level of empathy between the two experimental groups. Still, this speculation is purely theoretical, as we have not measured the hypothetical, spatial, social, or temporal distances. For the development of this theory, therefore, we suggest that future researchers should measure and compare these variables. Finally, our study did not make a distinction in terms of the group belonging of beneficiaries. That is, we did not measure whether children depicted in the video were perceived as ingroup or outgroup strangers by the participants. Even though Tassinari et al.'s (2022) findings suggest that users felt equally empathetic toward ingroup strangers compared to outgroup strangers, this is not always the case. Understanding this is vital for increasing our knowledge of prosociality in the domain of VR, as

people might depict different types of attitudes and behaviors toward ingroup compared to outgroup strangers (Gugenishvili, 2022).

Despite the above limitations, to our knowledge, this was the first study that compared spatial presence, attention allocation, spatial situation model, empathy, and donations in the same study. Our results suggest no advantage of VR stimuli in inducing the actual behavior of donations. Thus, more studies are needed on this topic to make sure that VR is indeed a better alternative to desktop computers for encouraging people to help.

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## **Appendices**

### ***Appendix 1***

#### **Instructions for the participants**

*Dear participant,*

*Thank you very much for your interest to participate in a study, where purpose is to understand decision-making. The study is part of a research project supported by the Turku Urban Research Programme.*

*During the study, you will be asked to watch a video and fill out a questionnaire regarding beliefs, behaviors, and demographics.*

*The entire study will take approximately 20-30 minutes.*

*Participation is voluntary and you may withdraw from the study at any stage (even after the data collection). Your answers are anonymous, but we track your attendance on campus according to the COVID-19 instructions of the university.*

*All surfaces, equipment, and data collection materials are disinfected after each use.*

*You can move and look around while watching the video but make sure you read the subtitles. Please do not discuss the video or questions with the research. This same information will be shown on the first page of the survey.*