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The Limited Benefits of Using Virtual Reality 360° Videos to Promote Empathy and Charitable Giving

Alison Jane Martingano[1,2], Sara Konrath[3], Evan Henritze[2], and Adam D. Brown[2,4]

Abstract
Charitable organizations have embraced virtual reality (VR); however, scientific evidence supporting its effectiveness for social good often uses poor experimental methodology and finds inconsistent results. We conducted a rigorous randomized control trial testing whether 360° video virtual reality increases empathy and charitable donations. Participants (N = 155) were randomly assigned to one of four conditions: (a) *Classic*: 360° footage of child refugees, (b) *Boost*: the same, but with perspective-taking instructions, (c) *Audiobook*: a control condition with the same information about child refugees but in text format, or (d) *Waiting Room*: another control condition with a 360° view of a waiting room. Although the Classic and Boost conditions increased emotional empathy compared to controls, they did not improve cognitive empathy more than the audiobook. Moreover, any empathic gains were mostly extinguished after 10 days. Critically, the Classic and Boost conditions did not influence charitable donations to a relevant charity (UNICEF). Therefore, charitable organizations may wish to tentatively reconsider their investment in 360° videos as, although they appear to make people feel empathic in the moment, these feelings do not appear to translate into tangible action.

[1]The Univeristy of Wisconsin—Green Bay, Green Bay, WI, USA
[2]The New School for Social Research, New York City, NY, USA
[3]Lilly Family School of Philanthropy, Indiana University, Indianapolis, IN, USA
[4]New York University School of Medicine, New York City, NY, USA

Corresponding Author:
Alison Jane Martingano, Psychology Department, The Univeristy of Wisconsin—Green Bay, 2420 Nicolet Drive, Green Bay, WI 54311-7003, USA.
Email: martinga@uwgb.edu

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Virtual reality (VR) is rising in popularity as a tool to promote social good. In 2016, VR giant Oculus released their "VR for Good" initiative to incentivize designers to create prosocial content (Matney, 2016). Not to be outdone by their leading competitor, HTC VIVE announced their $10 million "VR for Impact" program in 2017 (HTC VIVE, 2017). Many national and international charities have collaborated with technology companies both large and small to use VR in their fundraising campaigns in the last decade (e.g., Amnesty International, 2017; International Rescue Committee, 2016; Médecins Sans Frontières, 2016; UNICEF USA, 2015). In this study, we evaluated the effectiveness of virtual reality 360° videos for increasing empathy and charitable donations using a rigorous randomized control trial.

Charities, technology companies, and other VR enthusiasts hope to use VR technology to bring the suffering of distant strangers into people's homes so that they can see, hear, and empathize with people they might otherwise never encounter (Bailenson, 2018; Milk, 2015; Tsai, 2021). There are a wide variety of VR experiences currently available that were designed for this purpose. For example, *Clouds Over Sidra* uses real-life 360° video footage to place viewers inside a Syrian refugee camp and follow a day in the life of 12-year-old Sidra, a girl who has lived there for 18 months with thousands of other refugees (Arora & Milk, 2015). 360° videos differ from more interactive VR, which uses computer-generated (CG) footage to allow users to pick up objects, open doors, and move the limbs of their character. However, when charitable organizations turn to VR, they are nearly always using 360° footage rather than more costly and technologically advanced interactive experiences (e.g., Amnesty International, 2017; International Rescue Committee, 2016; Médecins Sans Frontières, 2016; UNICEF USA, 2015).

Despite its more passive nature, 360° VR may be useful for charitable organizations because it can depict real-life situations that potential donors may find hard to imagine, such as refugee camps, homeless shelters, or detention centers. Users do not need to struggle to take the perspective of other people in these situations because the VR experience does this for them (Ahn et al., 2013). In addition, because 360° videos can relieve the effort of perspective-taking, it may be a particularly effective fundraising tool when people are unwilling or unable to take other people's perspectives on their own. Finally, 360° videos are much less expensive than CG environments, costing as low as $10k/minute to create, whereas the same CG environment could cost nearly double that (Fade, 2019).

VR and Empathy

Virtual reality has been hailed as "the ultimate empathy machine" (Milk, 2015). But despite its popularity, experimental evidence for the empathy-building efficacy of VR generally, and 360° video specifically, is inconsistent. Although some VR interventions have led to increases in prosocial attitudes (Bujić et al., 2020; Markowitz et al., 2018) and increases in self-reported empathy (Bunn & Terpstra, 2009; Cohen et al., 2021; Formosa et al., 2018), these positive effects do not appear to exceed more traditional and low cost interventions, such as asking people to imagine what it would be like to experience someone else's situation (Jones & Sommer, 2018) or taking part in real-world role-play (Hargrove et al., 2020).

In addition, VR researchers have documented several important boundary conditions for the effectiveness of VR for increasing empathy. For example, VR may increase empathy in situations of low threat, but not in situations of high threat (Oh et al., 2016). Other research has found that although VR can increase empathy compared to a control task, it is much more effective when combined with an empathy writing task (Kalyanaraman et al., 2010).

Most importantly, for our purposes, a recent meta-analysis that included a variety of VR experiences (but mostly 360° videos) found that, on average, these interventions increased only one category of empathy (Martingano et al., 2020). Using data from 43 studies with 5644 participants, the researchers found that VR aroused users' emotional empathy, but not their cognitive empathy. Emotional empathy involves experiencing emotions in response to others' emotional experiences or expressions, whereas cognitive empathy involves understanding others' thoughts and feelings without necessarily reacting emotionally. This distinction between emotional and cognitive empathy is commonly used among empathy scholars, although there is some disagreement in the literature regarding exactly which concepts are classified under each category (Batson, 2009; Hall & Schwartz, 2019). In line with previous research on virtual reality and empathy (Martingano et al., 2020), we consider emotional empathy to include empathic concern and personal distress; and cognitive empathy to include emotion recognition and perspective taking (see Table 1).

A dual process model of empathy argues that emotional and cognitive empathy differ in the extent to which they require conscious deliberation (Yu & Chou, 2018). Emotional empathic responses are fast, automatic, and occur spontaneously (Neumann & Strack, 2000) even when participants are not consciously aware of what they are seeing (Dimberg et al., 2000). Many charitable campaigns attempt to take advantage of this phenomenon by using evocative photographs and vivid descriptions of human suffering to evoke spontaneous emotional empathy and solicit donations to charity (see Loewenstein et al., 2006, for a review). In contrast, cognitive empathy is a more deliberate skill that requires attention and sufficient cognitive resources. Cognitive load hinders multiple types of cognitive emapthy, including both emotion recognition (Ahmed, 2018) and perspective-taking (Davis et al., 1996). Unlike the evocative images that arouse emotional empathy, quite different experiences have been found to arouse cognitive empathy. For example, acting and creative writing, which both require conscious effort to create the mental states of the characters, have been found to improve emotion recognition (Goldstein & Bloom, 2010; Goldstein & Winner, 2012) and perspective taking (Shaffer et al., 2019). On its face, 360° virtual reality appears to share more in common with evocative advertisements that arouse emotional empathy than more complex and ambiguous experiences that arouse cognitive empathy.

Table 1. Description of Empathy Measures.

Empathy category	Subtype	Definition	Measure	Items
COGNITIVE EMPATHY *Understanding another person's thoughts or feelings.*	Perspective Taking	"Tendency to spontaneously adopt the psychological point of view of others" (Davis, 1983, pp. 113).	Cognitive Empathy Scale	I tried to imagine how I would feel if I were experiencing this for real, and not just in VR. I tried to "put myself in another person's shoes" for a while. I tried to understand others by imagining how things look from their perspective. I paid close attention to how the headset responded to my movements. (-) I was focused on the 360° technology, not the specific content I was experiencing. (-) My thoughts were mainly about how VR works and its possible uses. (-) I thought a lot about other people and what they might be thinking and feeling. I didn't waste time thinking about other people. (-) I paid attention to facial expressions, tone of voice, and body language of other people in the experience. I didn't put much thought into understanding other people in the experience. (-) I was focused on the graphics and the realism of the experience. (-) I very easily put myself in the place of other people. I kept thinking about how the world looks through other people's eyes. I found it difficult to see things from the other person's point of view. (-)
	Emotion Recognition	"[The] ability to accurately infer the specific content of another person's thoughts and feelings" (Ickes, 1993, pp. 588)	University of California Davis Set of Emotion Expressions (UCDSEE).	Participants identified emotions expressed in 44 photographs. Participants selected which emotion the target was expressing from these options: anger, embarrassment, fear, disgust, happiness, pride, sadness, shame, surprise, contempt, or neutral.

(continued)

Table 1. (continued)

Empathy category	Subtype	Definition	Measure	Items
			Empathic Accuracy Task	Participants identified how people were feeling from a short video clip. Accuracy was defined by how similar participants' ratings were to the person's own rating of their emotions while they were recording the video
EMOTIONAL EMPATHY *Feeling emotion in response to another person's expression of an emotion.*	Empathic Concern	"Other-oriented feelings of sympathy and concern for unfortunate others" (Davis, 1983, pp. 114)	Empathic Adjectives	For each adjective, report how much you experienced that emotion while in the VR experience. Sympathetic, Moved, Warm, Compassionate, Soft-hearted, Tender (1 = *not at all*, 7 = *extremely*).
			Emotional Empathy Scale (EC subscale)	I really felt an emotional response to what I was seeing. I felt very compassionate. I felt unsympathetic. (-) I was unmoved by the experience. (-) I felt a great deal of tenderness. I remained coldhearted throughout the experience. (-) I felt quite touched by the experience.
	Personal Distress	"Self-oriented feelings of personal anxiety and unease intense interpersonal settings" (Davis, 1983, pp. 114).	Emotional Empathy Scale (PD subscale)	I felt disturbed by what I saw. I was mostly objective, and I didn't feel caught up in it. (-) I felt concerned and ill-at-ease. I didn't feel emotionally involved. (-) This experience made me go to pieces. I lost control of my emotions. I felt detached. (-)

Note. VR = virtual reality; EC = empathic concern; PD = personal distress.

Media scholars have argued that one of the strengths of VR is that it removes the cognitive burden normally associated with perspective-taking (Ahn et al., 2013). However, this promise appears to also present a pitfall, as VR experiences may fail to provide an opportunity for users to practice perspective-taking and other cognitive empathy skills.

However, this limitation may be unique to certain types of VR experiences. In a small recent meta-analysis, interactive VR experiences have been found to increase cognitive empathy, but not emotional empathy (Ventura et al., 2020)—the reversed results from Martingano et al.'s (2020) larger meta-analysis that included 360° videos. The VR experiences included in this smaller meta-analysis allowed users to embody another person using computer-generated footage. This type of VR experience appears to be particularly effective at encouraging users to take the perspective of the person they are embodying (Van Loon et al., 2018). Unfortunately, however, 360° videos do not have this capability. Consistent with the results from Ventura et al.'s (2020) and Martingano et al.'s (2020) meta-analyses, it appears that the emotional punch of 360° videos may offer the opportunity to engage more automatic emotional empathy, whereas VR embodiment experiences may provide an environment to engage cognitive empathy.

In this study, we examined whether it is possible to have the best of both worlds and use the more affordable 360° videos to increase both emotional and cognitive empathy simultaneously. A few simple tweaks to the instructions when administering 360° videos may make this possible. For decades, social psychologists have simply asked people to imagine another person's perspective as a way of triggering the conscious deliberation required for cognitive empathy (Batson et al., 1997). By using similar perspective taking instructions in combination with a 360° video, it may be possible to increase both cognitive empathy *and* maintain the emotional empathy triggered by real-world footage.

VR and Prosocial Behavior

Research finds that *both* cognitive empathy and emotional empathy can lead to increased prosocial behaviors, like giving time and money (Batson, 2011; Decety & Svetlova, 2012). Thus, even if the effects of 360° videos are limited to one type of empathy, they may still help to encourage prosocial behaviors.

Charitable organizations have not waited for robust scientific evidence before using 360° video to solicit donations (Garcia-Orosa & Pérez-Seijo, 2020). In 2016, the charity *Water* collaborated with the production company *Within* to produce a VR experience that they claim generated over $2.4 million in donations (Swant, 2016). UNICEF is currently pilot testing *Clouds Over Sidra* on the streets of over 40 different countries. UNICEF has reported that *Clouds over Sidra* has doubled their donation rate among donors and increased the amount given by 10% (UNDP, 2015). These numbers are encouraging; however, they appear not to have been subjected to rigorous scientific tests and suffer from issues with self-selection, lack of control groups, placebo effects, and other uncontrolled variables that may influence the results. For example, donations could have increased for other reasons than the 360° videos, and it's important to understand the effects of costly new solicitation techniques before widely implementing them—especially when there are free and effective alternatives like perspective taking instructions.

However, there is some empirical evidence that 360° videos can lead to changes in behavior, or at least, behavioral intentions. Watching the 360° video *Clouds of Sidra* via a VR headset led participants to indicate that they would donate to charity (Alberghini, 2020; Yoo & Drumwright, 2018). Similarly, a 360° VR experience about social and climate issues increased hypothetical donations of time and money to a relevant charity (Kandaurova & Lee, 2019). However, participants' actual donation behavior was not measured in any of these studies.

Indeed, very few scientific studies have measured real behavioral change, with a few notable exceptions. In favor of VR, one study found that cutting a tree down in VR led participants to use 20% fewer paper napkins than those who had simply read about deforestation (Ahn et al., 2014). In addition, embodying a patient who needs a kidney donation increased donations to a dialysis organization (Li & Kyung Kim, 2021). In favor of 360° videos specifically, one study has found that a 360° video about the importance of coral reefs increased donations toward a local conservation charity, compared to a written request for donations (Nelson et al., 2020). However, there are reasons to suspect that 360° videos do not increase donations above and beyond more low-tech solutions. For example, researchers have found that a 360° video experience showing the destroyed city of Aleppo increased donations to a local refugee charity compared to reading, but not compared to watching the same video on a normal computer screen (Gürerk & Kasulke, 2018). Similarly, a 360° video of child refugees at risk of malaria did not prompt greater donations when played on a VR headset compared to a normal computer screen (Breves, 2020). This suggests that VR may not be *uniquely* effective at increasing donations compared to low cost alternatives, and indicates the importance of choosing control groups carefully.

Most of the previous research using VR for social good has used control groups that differed from the VR group in more than one way, including content, immersion, and novelty, thus potentially confounding results. To our knowledge, only one study controlled for novelty and immersion in VR by using a VR control group (Rosenberg et al., 2013). This research found that participants who flew around a virtual city as a superhero to collect a child's insulin were more likely to help pick up spilled pens after the experience, compared to participants who had flown around the virtual city as part of a sightseeing tour. The authors concluded that it was the *content* of the experience, rather than simply the novelty and immersivity of VR, that explained their results.

Overall, the mixed results for donations and the lack of comparable control groups warrant further research to see whether 360° videos are uniquely useful for increasing donations to charity.

The Current Study

This research aims to contribute to the burgeoning field of VR for social good with a rigorous experimental design. Given the popularity of 360° videos for nonprofit organizations (Garcia-Orosa & Pérez-Seijo, 2020), it is important to evaluate whether 360°

videos are effective at promoting empathy and charitable giving. Specifically, we aimed to examine the effect of a 360° video on emotional versus cognitive empathy and also to determine how it affected prosocial behavior in the form of giving to a relevant charity.

We preregistered our hypotheses (https://aspredicted.org/bv8qw.pdf). In line with previous research, we predicted that 360° VR experiences (Classic) would lead to higher levels of emotional empathy compared to control groups (Audiobook and Waiting Room), but not higher levels of cognitive empathy. In addition, we predicted that when the 360° video VR experience was accompanied by perspective taking instructions (Boost condition), it would also increase cognitive empathy compared to control groups (Audiobook and Waiting Room). We also explored how 360° videos impact real donation behavior; however, we did not preregister predictions for donation behavior.

Method

Design

Five key design choices aim to overcome the limitations of previous research. First, although the nature of VR technology means that participants are aware that they are in a VR condition, there is no need to compound this with the possibility that an experimenter's knowledge of conditions and expectations of efficacy may influence the results. To mitigate this risk of experimenter bias, we used a single-blind procedure where the experimenter administering the dependent measures was unaware of the participant's condition. Second, to ensure that the novelty of wearing a VR headset would not create a placebo effect, we developed control groups that required these participants to also wear a VR headset—unlike most previous research. In this way, any difference in participants' empathy and prosocial behaviors cannot be due to the headset alone.

Third, we used both self-report and behavioral measures. Although empathy and prosocial behavior are commonly measured with self-reports, their results could be influenced by social desirability bias (Baumeister et al., 2007). Self-report measures of cognitive empathy appear particularly problematic because participants may be reluctant or unable to report this accurately (Murphy & Lilienfeld, 2019). By using behavioral measures of cognitive empathy and a real-donation paradigm, we can be more confident in our results.

Fourth, we asked participants to complete a follow-up 10-days later to determine if changes in empathy persisted over time—a design feature notably missing from most previous research (Martingano et al., 2020). Fifth, we used two control groups to reduce the influence of possible confounding variables. For a reasonable claim to be made that 360° videos have a unique benefit above other empathy interventions, the impact of these videos should exceed both a non-360° experience with the same content (Audiobook control) and a 360° video without the relevant content (Waiting Room control). Using two control groups provides a conservative test of the efficacy of 360° videos.

Participants

Participants were 169 adults who were recruited through New York City Craigslist, flyers, and student email lists. We calculated that a sample size of 140 was required to have 0.80 power to detect a 0.33 (small-to-medium) effect size with a 0.05 alpha, but over-recruited to account for possible attrition. We estimated the effect size from a previous meta-analysis which determined the average overall effect of VR on empathy (Martingano et al., 2020). Participants were paid $10 for completing the initial VR testing session and another $20 for completing a follow-up survey 10 days later. Student participants had the option of receiving course credit in lieu of the follow-up payment.

Fourteen participants were excluded from data analyses because they failed to follow task instructions or due to data collection or technology errors (final $N = 155$). Participants (82 women, 66 men, and 7 people of other genders) ranged from 18 to 65 years (mean age 34.7), and represented a variety of races (34% White, 25% Black, 17% Asian, 24% people of other races) and household incomes (54.2 % under $50,000, 32.4% between $50,000 and $100,000, and 12.9% above $100,000). However, the sample was more educated (67% with a college degree) and liberal (71.0%) than the general US population. Participants all had normal or corrected-to-normal vision. Participants with a family history of epilepsy, a pacemaker, or other implanted devices were not eligible for safety reasons. During the experiment, no participants reported adverse reactions to VR (e.g., cybersickness).

Procedure

Before coming to the laboratory, participants were provided with a link to an online survey hosted by Qualtrics (Time 0). Once they arrived, participants spent 12 minutes with the VR headset on in one of four conditions. Immediately following the experience (Time 1), participants completed behavioral and self-report measures of empathy and a donation task. The headset experience and dependent measures were administered by different experimenters to ensure a single-blind design. Approximately 10 days later, at Time 2, participants completed additional measures of empathy via an online Qualtrics survey at a time and location of their choice.

Time 0: Pretest. Participants completed a survey online that measured baseline dispositional empathy (e.g., chronic tendencies to imagine others' perspectives and feel care and compassion). Participants also completed a measure of familiarity with technology. Participants could complete this pretest survey any time before they came to the laboratory.

Time 1: Posttest. Participants were randomly assigned to one of four conditions: an experimental condition (Classic or Boost), or one of two control conditions (Audiobook or Waiting Room). All conditions involved the use of an Oculus Go VR headset and lasted approximately 12 minutes.

Participants in the Classic Condition watched a documentary-style 360° video called "The Displaced," created by *The New York Times*, which describes the experiences of three children driven from their homes by war (https://www.with.in/watch/

the-displaced; The New York Times, 2015). Participants in the Boost condition watched the same video and were instructed to take the perspective of the children (see Supplementary Materials for script). Participants in the audiobook condition read three substantially similar stories about each child, also written by *The New York Times* (see Supplementary Materials). The text was projected onto a virtual whiteboard and was read aloud by an actor while the text scrolled on screen. The Waiting Room condition required participants to wait in a 360° video virtual waiting room shot with the same high-definition camera type used in the experimental VR conditions.

Immediately following the VR experience, participants completed two self-report measures of emotional empathy (*Empathic Adjectives, Emotional Empathy Scale*); two behavioral measures of cognitive empathy (*Empathic Accuracy Task, UCDSEE*), and one self-report measure of cognitive empathy (*Cognitive Empathy Scale)*, as part of a larger test battery. Participants were then paid \$10 in \$1 bills and offered the opportunity to donate to the United Nations International Children's Emergency Fund (UNICEF) to help child refugees. Participants were assured they did not have to donate, and that all funds would be given to UNICEF, with a receipt posted online as proof at the end of the study. Participants were left an envelope in which to place their donation if desired. The experimenter then left the room and returned after the participant left to collect and document the donation. All donations were pooled and donated to UNICEF at the completion of the study (total = \$374.00).

Time 2: Follow-up. Approximately 10 days later (M = 10.04, SD = 4.02), participants completed the same two measures of emotional empathy (*Empathic Adjectives, Emotional Empathy Scale*) and the same three measures of cognitive empathy (*Cognitive Empathy Scale, Empathic Accuracy Task, UCDSEE*) via an online Qualtrics survey, at a time and location of their choice. Participants were then debriefed.

Measures Time 0: Pretest

Interpersonal reactivity index (IRI). To measure dispositional empathy, participants completed the Empathic Concern (EC), Perspective-Taking (PT), and Personal Distress (PD) subscales of the IRI (Davis, 1983) before coming into the laboratory. Items included "I sometimes try to understand my friends by imagining how things look from their perspective" for the PT subscale (α = .79); "I often have tender, concerned feelings for people less fortunate than me" for the EC subscale (α = .76); and "In emergency situations, I feel apprehensive and ill-at-ease" for the PD subscale (α = .80). Respondents rated themselves on each item using a 7-point scale (1 = *does not describe me well*, 7 = *describes me very well*).

Familiarity with technology. Participants indicated the regularity in which they used a variety of technological devices including televisions, smartphones, laptops, and VR headsets before coming into the laboratory. Respondents rated their use of each device as either: 0 = *never*, 1 = *irregularly*, 2 = *annually*, 3 = *monthly*, 4 = *weekly*, or 5 = *daily* (Overall: α = .73, VR: α = .64).

Measures Time 1 and 2 (Posttest and Follow-up)

Emotional empathy measures

Empathic adjectives. Participants indicated to what extent they felt six empathic feelings at that moment (1 = *not at all*, 7 = *extremely*; α = .91). These adjectives are commonly used to assess empathic concern: sympathetic, compassionate, soft-hearted, warm, tender, and moved (Batson, 1991).

Emotional empathy scale. We adapted items from the empathic concern and personal distress subscales of the Interpersonal Reactivity Index (Davis, 1983) to create a 14-item state measure of emotional empathy in VR (see Table 1 for items). This state measure assesses momentary empathic feelings rather than chronic dispositional tendencies to be empathic. Participants rated to what extent the items represented their thoughts and feelings toward the VR experience (1 = *not at all*, 7 = *extremely*; total scale α = .90; empathic concern α = .86; personal distress α = .79).

Cognitive empathy measures

Cognitive empathy scale. We adapted items from the perspective-taking subscale of the Interpersonal Reactivity Index (Davis, 1983) and added 7 novel items of similar style to create a 14-item state measure of cognitive empathy in VR (see Table 1 for items). Again, this state measure assesses momentary responses rather than chronic dispositions. Participants rated to what extent the items represented their thoughts and feelings toward the VR experience (1 = *not at all*, 7 = *extremely*; α = .83).

UC Davis set of emotion expressions (UCDSEE). Participants identified emotions expressed in photographs. Participants first fixated on a red cross that appeared on the screen. A target photograph then appeared for 1000 ms and participants selected which emotion the target was expressing from these options: anger, embarrassment, fear, disgust, happiness, pride, sadness, shame, surprise, contempt, or neutral. Each of the 11 emotions were depicted by two actors, one black and one white, of both genders, totaling 44 (Tracy et al., 2009). Higher scores indicate that participants can correctly infer the mental states of others, a key component of cognitive empathy (α = .71).

Empathic accuracy task (EAT). Participants identified how people were feeling from a short video clip. Accuracy was defined by how similar participants' ratings were to the person's own rating of their emotions while they were recording the video (Ong et al., 2019). While the video was playing, participants used a slider to indicate how the target was feeling—from very negative to very positive. The location of the slider was automatically recorded every 50 ms, allowing a dynamic measure of emotion recognition. Higher scores indicate that participants can correctly infer the mental states of others, a key component of cognitive empathy. In an effort to reduce the likelihood of order effects, participants watched four different videos during Time 1 and Time 2. Unfortunately, due to a technical error, only the data from the last video at each time point was saved. Both of these videos were negative in valence, but differed in content. In one video, a woman described losing her dog, and in the other, a man described his grandfather's passing.

Participants also completed exploratory measures of self-efficacy, presence and interactivity, emotional arousal, and emotional responsiveness, but we had no expected hypotheses for these measures and these results will not be reported further.

Results

We preregistered our analysis plan with https://aspredicted.org/bv8qw.pdf and report all preregistered analyses here. In addition, exploratory analyses are available as part of our supplementary materials at https://osf.io/4jazd/?view_only=4bd5e64c99f04ee38d49450e42cc9ff3.

There were no significant differences in dispositional empathy or familiarity with technology across participants allocated to each condition (all p values $> .05$, see Table 2). Only a few participants failed to finish the Time 2 survey ($N = 9$), and there was no evidence of differential attrition across conditions ($p = .29$). Results for Time 1 remain consistent even if these participants are excluded from the analysis.

Analyses

We conducted ANOVAs for each dependent variable at each time point, with post hoc comparisons. All analyses reported here were preregistered.

Emotional Empathy. Both experimental conditions (Classic and Boost) significantly increased participants' emotional empathy compared to the control conditions immediately following the experience (see Table 3). This Time 1 result was consistent for all emotional empathy measures (discussed in detail below). At Time 2, the results for these two measures diverged slightly but generally indicated a diminishment in empathy to that led the experimental conditions be more similar to controls (see Table 4).

Empathic adjectives. Immediately following the intervention, participants in the Classic and Boost conditions reported significantly higher empathic feelings ($M_{\text{classic}} = 5.59$, $SD_{\text{classic}} = 0.99$; $M_{\text{boost}} = 5.26$, $SD_{\text{boost}} = 1.13$) than those in the Audiobook condition ($M = 4.37$, $SD = 1.01$), who in turn reported significantly higher empathic feelings than participants in the Waiting Room condition ($M = 1.92$, $SD = 1.10$, see Table 3). Ten days later, there was no difference between conditions in emotions reported on the Empathic Adjectives task, indicating that these feelings were only temporary ($p = .255$, see Table 4).

Emotional empathy scale. Immediately following the intervention, participants in the Classic and Boost conditions reported significantly higher empathic concern ($M_{\text{classic}} = 6.06$, $SD_{\text{classic}} = 0.98$; $M_{\text{boost}} = 5.98$, $SD_{\text{boost}} = 0.86$) than those in the Audiobook condition ($M = 5.20$, $SD = 0.86$), who in turn reported higher empathic concern than participants in the Waiting Room condition ($M = 3.33$, $SD = 0.98$, see Table 3). In addition, participants in the Classic and Boost conditions reported significantly higher

Table 2. Pre-existing Differences in Dispositional Empathy, Familiarity with Technology, and Attrition Rate by Condition.

	Experimental conditions		Control conditions				
Variable	Classic ($N = 43$)	Boost ($N = 33$)	Audiobook ($N = 40$)	Waiting room ($N = 39$)	$F(3,151)$	p	η^2
Attrition rate (count, %)	3 (7.0%)	2 (6.0%)	4 (10.0%)	0 (0.0%)	1.27	.288	0.03
Familiarity with technology (mean, *SD*)							
Overall	3.36 (0.77)	3.12 (0.82)	3.30 (0.79)	3.27 (0.84)	0.50	.686	0.01
Virtual reality	1.59 (0.85)	1.36 (0.82)	1.47 (0.84)	1.38 (0.79)	0.66	.580	0.01
Dispositional empathy (Mean, *SD*)							
Perspective-taking	4.39 (1.15)	4.61 (0.77)	4.49 (1.07)	4.47 (0.85)	0.31	.817	0.01
Empathic concern	4.42 (1.01)	4.45 (0.91)	4.62 (1.00)	4.59 (0.83)	0.42	.737	0.01
Personal distress	2.83 (1.16)	2.74 (1.17)	3.00 (1.15)	2.88 (1.00)	0.35	.793	0.01

Note. *SD* = standard deviation.

Table 3. Means, Standard Deviations and One-Way ANOVAs for All Preregistered Analyses at Time 1.

Variable	Experimental conditions		Control conditions				
	Classic (N = 43)	Boost (N = 33)	Audiobook (N = 40)	Waiting room (N = 39)	$F(3,150)$	p	η^2
Emotional empathy							
Empathic adjectives	5.59 (0.99)^{a}	5.26 (1.13)^{a}	4.37 (1.01)^{b}	1.92 (1.10)^{c}	96.62	<.001	0.66
Emotional empathy scale	5.35 (0.81)^{a}	5.34 (0.82)^{a}	4.38 (1.05)^{b}	3.01 (0.84)^{c}	59.94	<.001	0.53
Empathic concern	6.06 (0.98)^{a}	5.98 (0.86)^{a}	5.20 (0.86)^{b}	3.33 (0.98)^{c}	63.50	<.001	0.56
Personal distress	4.70 (0.93)^{a}	4.64 (0.90)^{a}	3.77 (1.03)^{b}	2.68 (0.86)^{c}	38.56	<.001	0.45
Cognitive empathy							
Cognitive empathy scale	5.13 (0.76)^{a}	5.24 (0.86)^{a}	4.83 (0.89)^{a}	3.42 (0.86)^{b}	38.44	<.001	0.43
UCDSEE	28.47 (5.53)^{a}	28.64 (4.44)^{a}	29.90 (4.73)^{a}	28.67 (4.84)^{a}	0.72	.543	0.05
Empathic accuracy task	69.73 (11.56)^{a}	72.24 (10.87)^{a}	66.46 (13.96)^{a}	69.85 (13.21)^{a}	1.22	.306	0.03
Prosocial behavior							
Donation amount ($)	4.50 (4.21)^{a}	4.58 (3.58)^{a}	3.50 (2.83)^{a}	3.83 (3.63)^{a}	0.44	.723	0.02
Donation (count, %)	22 (51%)^{a}	22 (67%)^{a}	19 (48%)^{a}	18 (46%) ^{a}	0.86	.464	0.02

Note. Means on the same row that share the same superscript are not significantly different from each other (Tukey's HSD, $p < .05$). UCDSEE = University of California Davis Set of Emotion Expressions

Table 4. Means, Standard Deviations and One-Way ANOVAs for All Preregistered Analyses at Time 2.

Variable	Experimental conditions		Control conditions				
	Classic ($N = 40$)	Boost ($N = 31$)	Audiobook ($N = 36$)	Waiting room ($N = 39$)	$F(3,141)$	p	η^2
Emotional empathy							
Empathic adjectives	3.89 (1.63)^a	3.39 (1.49)^a	3.75 (1.51)^a	3.27 (1.44)^a	1.39	.2548	0.03
Emotional empathy scale	4.87 (1.05)^a	5.01 (0.85)^a	4.20 (1.13)^b	2.91 (1.01)^c	32.82	<.001	0.41
Empathic concern	3.94 (0.62)^a	3.63 (0.72)^{ab}	3.50 (0.82)^b	2.73 (0.71)^c	20.02	<.001	0.30
Personal distress	3.16 (0.89)^a	2.84 (0.77)^a	2.94 (0.85)^a	2.83 (0.77)^a	1.29	.281	0.03
Cognitive empathy							
Cognitive empathy scale	4.99 (0.98)^a	5.11 (0.92)^a	4.72 (0.89)^a	3.49 (0.96)^b	23.69	<.001	0.33
UCDSEE	25.21 (9.26)^a	27.97 (8.56)^a	26.68 (10.08)^b	29.36 (6.62)^c	1.66	.178	0.03
Empathic accuracy task	78.72 (23.16)^a	80.43 (17.05)^a	66.80 (27.97)^b	82.84 (18.00)^a	3.79	.012	0.07

Note. Means on the same row that share the same superscript are not significantly different from each other (Tukey's HSD, $p < .05$). UCDSEE = University of California Davis Set of Emotion Expressions personal distress ($M_{classic}$ = 4.70, $SD_{classic}$ = 0.93; M_{boost} = 4.64, SD_{boost} = 0.90) than those in the Audiobook condition (*M* = 3.77, *SD* = 1.03), who in turn reported higher personal distress than participants in the Waiting Room condition (*M* = 2.68, *SD* = 0.86, see Table 3). However, at Time 2, only participants in the Classic condition reported significantly more empathic concern than both control groups, as participants in the Boost condition no longer significantly outperformed the Audiobook control. Classic, Boost, and Audiobook conditions continued to outperform the Waiting Room Control in terms of empathic concern (see Table 4). In contrast, there was no significant difference between conditions in personal distress reported at Time 2, indicating that any distress felt was only temporary (p = .281, see Table 4).

Cognitive empathy. In comparison to emotional empathy, our results indicate that VR has no unique benefit for increasing cognitive empathy (discussed below, see Table 3 and 4).

Cognitive empathy scale. Immediately following the intervention, participants in the Boost (*M* = 5.24, *SD* = 0.86) and Classic (*M* = 5.13, *SD* = 0.76) conditions did not report significantly higher levels of perspective taking than the Audiobook Control (*M* = 4.83, *SD* = 0.89), although they did show benefit compared to the Waiting Room Control (*M* = 3.42, *SD* = 0.86, Table 3). This same trend persisted at Time 2 ($p < .001$, Table 4).

UC Davis set of emotion expressions (UCDSEE). There was no significant effect of conditions on UCDSEE performance. Experimental interventions did not yield a better ability to recognize emotional expressions from still photographs at Time 1 (p = .543, see Table 3), nor at Time 2 (p = .178, see Table 4).

Empathic accuracy task (EAT). At Time 1, there was no significant effect of the condition on EAT performance. Experimental interventions did not yield better ability to recognize emotional expressions from videos (p = .306, see Table 3). However, at Time 2, EAT performance was unexpectedly poorer for participants in the Audiobook condition (*M* = 66.80, *SD* = 27.97) compared to all other conditions (see Table 4). Nevertheless, given that the participants in the two experimental conditions did not outperform the Waiting Room Control condition, this unexpected result does not challenge the overall finding that 360° videos are ineffective at increasing cognitive empathy beyond controls.

Prosocial behavior. Overall, 52.26% of participants chose to donate to UNICEF following the VR experience, with those donating giving $4.25 on average.[1] Critically, however, there was no significant difference in the amount participants donated depending on the condition they were in (p = .723). The condition also had no impact on participants' likelihood of giving (p = .464, see Table 3). To explore donation behavior further, we dummy-coded each condition (with the Waiting Room condition as a reference group) and then ran a logistic regression to examine how each condition changed the odds of giving. None of the conditions significantly increased participants' likelihood of giving (all $p > .05$).

Discussion

Our results demonstrated that 360° VR experiences had limited utility for increasing empathy and charitable giving to a relevant cause. Even when accompanied with perspective-taking instructions, a prosocial 360° VR experience generally only promoted feelings of emotional empathy in the short term. These experiences did not appear to improve cognitive empathy beyond the benefits of more low-tech solutions such as an audiobook, nor did they produce long-term empathic gains. Most critically, these experiences did not yield greater donations to charity, despite the fact that the charity recipient group matched the VR experience. The only persistent benefit of this 360° video was that, when asked how much empathic concern participants felt toward the child refugees depicted, participants who had watched the 360° video reported higher levels of empathic concern. In other words, it seems that 360° videos elicit persistent feelings of concern but not actions.

One potential explanation for these null results may be that 360° videos influenced people with low and high baseline levels of dispositional empathy differently (Wei et al., 2021). However, exploratory analyses of our data find no support for this explanation, as baseline dispositional empathy did not moderate the effect of condition on any of our dependent variables (see Supplementary Materials).

The use of two control groups in this study provides a conservative and rigorous estimate of the efficacy of 360° video, ultimately showing that it does not exceed the effectiveness of other more low-tech solutions. The results from this study contradict the accepted wisdom of nonprofit organizations that have flocked to 360° videos in recent years to solicit donations (Garcia-Orosa & Pérez-Seijo, 2020). However, these results are not wholly unexpected. For example, Breves (2020) and Gürerk and Kasulke (2018) also found limited efficacy of 360° videos on donation behavior.

In terms of empathy, our null results are also consistent with previous research suggesting that fostering cognitive empathy may require more deliberate effort than 360° video encourages (Martingano et al., 2020). Even when paired with perspective-taking instructions in the Boost condition, 360° videos did not appear to provide an opportunity for participants to engage in this effortful skillset. It is possible that the amount of information presented in the experimental VR conditions may have rendered the perspective-taking instructions moot. The refugee children described their thoughts and feelings quite clearly, so it is possible that participants could accomplish their perspective-taking task with very little effort—so little effort, in fact, that they may not have benefited from the exercise at all. To ensure this is not the case, VR creators may want to design experiences that are more subtle, ambiguous, and leave room for people to use their own imagination. It is important to note that some VR experiences may already achieve this, with VR embodiment experiences perhaps being more suited to increasing cognitive empathy (Ventura et al., 2020).

Nevertheless, it could be argued that existing 360° videos are still a useful tool among many for increasing empathy. Although 360° videos do not exceed the efficacy of more low-tech solutions, they match their effectiveness at increasing some types of empathy. Moreover, given the novelty and excitement surrounding VR, it may be easier to motivate potential donors to engage with it than more traditional written or audio solicitation formats. If 360° video helps to reduce apathy and promote initial interest in marginalized topics, it may be uniquely placed to overcome some of the barriers to promoting social good by getting people to take notice in the first place. It may also be useful for educating individuals about a cause (e.g., Bujić et al., 2020; Markowitz et al., 2018), even if it does not change their behaviors. Nevertheless, it is important to reiterate that neither experimental condition, nor the more traditional Audiobook format, led to more donations than the Waiting Room control.

There are limitations to the current study. For example, we asked participants to donate after completing a variety of empathy measures. These measures took participants approximately 15 minutes to complete. It is possible that participants' emotional arousal diminished over this short time and that donations may have been higher if we had asked participants to donate immediately following (or during) the VR experience. We hope that future research will help to establish the temporal boundary conditions around the effectiveness of VR more precisely. From our results alone, we can conclude that 360° videos do not increase donations following a short wait. Donations might be higher if solicited earlier, or indeed later (possible boomerang effects over time).

Our results are also constrained by the type of VR experiences we used, as well as the headset they were displayed on. *The Displaced* is a highly realistic 360° video experience made with real-world footage. We do not make any claims beyond this type of experience. Indeed, it is possible that more interactive computer-generated experiences may influence empathy differently (see Ventura et al., 2020). For example, embodying another person or engaging in active interaction requires more mental engagement and therefore may enhance cognitive empathy and possibly even donation behavior in a way that 360° videos do not. Moreover, the 360° waiting room we used involved little movement and audio stimulation. Control 360° content with more exciting and dramatic events (but unrelated to charitable giving) may have provided a more robust control group. The current research focused exclusively on a 360° video and thus limits our claims to these types of VR experiences. Yet, these are the most commonly used VR experiences among nonprofits, likely because they are less expensive than more interactive forms. Therefore, we believe this study constitutes an important first step in understanding the limitations of using these popular VR experiences to promote charitable giving.

The technological affordances of the Oculus Go headset are well suited to rendering this experience in the most immersive manner possible (high-definition, stereoscopic visuals with diegetic, spatialized sound). The Oculus Go also has natural movement tracking and a high update rate (72 Hz), allowing the image to adapt seamlessly to the viewer's gaze as they look around. By using this headset, we believe we were presenting *The Displaced* in a manner that was most likely to positively influence participants' behavior. However, it is possible to watch *The Displaced* (and other 360° videos) on less immersive technology, including on personal smartphones using a cardboard headset. Given the reduced cost and practical ease of these lower tech solutions, philanthropic organizations may be tempted to use them in their fundraising campaigns. Although we did not specifically test the efficacy of these lower tech solutions, we see no reason to assume that they would be *more* effective than the headset used in our research.

Our sample comprised participants from a Western, Educated, Industrialized, Rich and Democratic (WEIRD) society (Henrich et al., 2010), which limits its representativeness (Rad et al., 2018). In addition, our New York sample was comprised of mostly liberal, educated Americans, and thus readers should be cautious about making claims beyond this population. It is particularly important not to generalize these results to different cultures, as the nature of empathy and charitable giving changes with culture (Chopik et al., 2017; Wiepking & Handy, 2016). Nevertheless, this WEIRD population is likely of interest to national and international charities as potential donors, and thus, it is still useful to understand the effectiveness of 360° videos within this group.

Notwithstanding the above limitations, this paper offers an important contribution to understanding the utility of VR for social good. We find that in the short-term, a prosocial 360° video increases emotional, but not cognitive empathy, which is in line with a recent meta-analysis (Martingano et al., 2020). We expand on this previous research by indicating that the boost in emotional empathy is largely temporary. In addition, our donation results indicate that existing enthusiasm for VR among charitable organizations may need to be tempered. A 360° video did not promote increased giving, even if it had limited effects on emotional empathy. Given the cost of creating 360° videos (approximately $10k/minute; Fade, 2019), charitable organizations may well question their investment in this VR technology. Indeed, donors may not support the use of their gifts for the creation of VR since it diverts the funds away from the cause itself, without any apparent increase in charitable donations.

When working with a new technology such as VR, researchers must invent novel ways to control for confounding variables, placebo effects, and demand characteristics that may lead to false positives. By using a single-blind randomized control design with sufficient power to detect an effect, we find limited benefits from 360° videos for empathy and charitable giving. Of course, the results of a single study can never be conclusive, and we welcome further attempts at replication to determine the efficacy of other 360° experiences (Jun et al., 2020). Nevertheless, in light of our results, we recommend that charities tentatively reconsider their investment in 360° videos. It seems that these experiences make people feel empathic in the moment, but this does not appear to translate into tangible action.

Author's Note

Sara Konrath is also affiliated to Institute for Social Research, University of Michigan, Michigan, MI, USA.

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ORCID iDs

Alison Jane Martingano https://orcid.org/0000-0001-8407-8611

Sara Konrath https://orcid.org/0000-0001-9182-0095

Supplementary Materials

All supplementary materials including the data and codes that produce the findings reported in this article are available at https://osf.io/4jazd/?view_only=4bd5e64c99f04ee38d49450e42cc9ff3

Note

1. In total, participants included in this research donated $313.50. The total donated to UNICEF was $374.00 which includes donations from excluded participants.

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Author Biographies

Alison Jane Martingano, PhD, is an Assistant Professor at the University of Wisconsin - Green Bay. Her research focuses on empathy and perspective-taking. She is interested in how modern technology, social interactions, and general life experiences shape peoples' ability to understand each other. She is also a passionate educator, with a particular interest in helping first-generation students access higher education.

Sara Konrath, PhD, is an Associate Professor at the Indiana University Lilly Family School of Philanthropy. She directs the Interdisciplinary Program on Empathy and Altruism Research, a research lab with a primary focus on motivations, traits, and behaviors relevant to giving, volunteering, and other prosocial behaviors (https://www.ipearlab.org/).

Evan Henritze, MA, is a clinical psychology doctorate student at the New School for Social Research.

Adam Brown, PhD, is the Vice Provost for Research and an Associate Professor of Psychology at the New School for Social Research, where he directs the Trauma and Global Mental Health Lab. He is also an Adjunct Assistant Professor in the Department of Psychiatry at New York University School of Medicine. His research focuses on the study of stress and trauma and the development of scalable mental health interventions.