



Using virtual reality to increase charitable donations

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Abstract

Marketer interest in using virtual reality (VR) as a persuasion tactic continues to rise. Notably, one sector at the forefront of utilizing this tactic for persuasive means is nonprofit marketing. Many charities have devoted considerable resources to creating VR appeals under the assumption that this medium will increase donations over and above present tactics. However, research has not yet examined the persuasive consequences VR may provide over more traditional channels. This research seeks to understand the opportunities and limitations this emerging tactic can offer marketers. Specifically, we examine the donation effectiveness of three real VR charitable appeals by assessing actual donation behaviors, and find that VR appeals increase donations compared to a two-dimensional (2D) format. This work addresses a timely and relevant issue for practitioners and opens doors to future research investigating VR's applications to marketing.

Keywords Virtual reality · Charitable giving/donations · Persuasion · Digital marketing

Even just 5 years ago, access to virtual reality (VR) technology, an artificial environment experienced with highly realistic and enhanced sensory stimuli (Lanier, 1992; Lanier & Biocca, 1992), seemed out of reach to the mainstream consumer. However, recent technological advancements have not only made access to low-cost VR

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technology possible, but also attainable for everyday consumers. Industry sales in 2019 totaled \$6B USD, and over 14 million headsets were sold between 2017 and 2019 (Statista, 2021). In fact, in 2019, 19% of US households used a VR headset to consume content (AR Insider, 2020). Given the rapid consumer adoption of this technology, it is no surprise that marketers have integrated VR content into their strategies (e.g., Marriott, Tourism Australia). Notably, one sector at the forefront of VR content utilization is nonprofit marketing (Nielsen Insights, 2017).

Many international and domestic charities (e.g., Oxfam, UNICEF) have devoted significant financial, time, and human resources to create powerful, vivid appeals that potential donors experience *virtually* (Samit, 2017). The hope is that this medium will be more effective at generating donations than traditional channels. For example, Birdlife International spent £40,000 developing its VR appeal highlighting the plight of penguins (Stuart, 2018). Similarly, Charity: Water, a nonprofit that provides clean drinking water in developing nations, spent over \$100,000 USD filming an appeal in Ethiopia, an amount much closer to the minimum cost for VR appeals than the maximum (NonProfit Times, 2016).

Nonprofits' race to differentiate themselves from one another using VR is understandable. The competition for donors' dollars is fierce—there are 1.5 million registered nonprofits in the USA (NCSS, 2019), yet Americans only support 4.5 charities on average (Jarvis, 2020). Furthermore, the COVID-19 pandemic resulted in increased demand for nonprofits' services (Imagine Canada, 2020), yet handicapped their traditional fundraising techniques that often represent a considerable proportion of organizational revenue (e.g., events; Walters & Cobb, 2019). VR offers charitable marketers a prospective tool to create novel, immersive, and persuasive appeals that potential donors can experience safely in their own homes. Thus, understanding VR's potential to generate increased donations is both timely and of critical importance; indeed, the central hypothesis of the current research is that VR charitable appeals generate higher actual donations than appeals in other formats.

Despite its growing use in the nonprofit sector, research has not yet determined whether the higher costs required to produce VR appeals are offset by higher donations; in fact, academic investigations of any VR marketing applications remain scant (Loureiro et al., 2019; Schmitt, 2019; Wedel et al., 2020). Because of the intense scrutiny charities face to efficiently utilize donor's dollars (Gneezy et al., 2014) and the immediate need to generate donations virtually during an economic downturn, it is important to provide evidence of the financial benefits of VR in this domain.

Across three studies, all utilizing real charitable advertising appeals spanning multiple causes and actual donation behavior, the current research demonstrates that VR has the potential to increase donations compared to traditional two-dimensional (2D) channels. Our research contributes to the marketing and charitable giving literatures by examining the effectiveness of a novel, emerging persuasion tactic (VR), and demonstrating its positive potential for charitable donations. Our findings are critical to communicate to theory and practice, not only because of the rapid marketer adoption of this emerging technology, but also because the COVID-19 pandemic is forcing charitable marketers to connect with potential donors through new channels. Importantly, we also contribute to practice by informing both nonprofit

and brand marketers of the benefits and limitations this technology can offer, providing suggestions on content design strategies, and opening multiple research avenues to extend understanding of this new technology's use in marketing.

1 Studies overview and set-up

All studies followed a single-factor two-condition (media type: VR vs. 360-degree 2D video) between-participants design. We compare VR appeals to identical 360-degree 2D video appeals to ensure that across conditions participants were able to adjust their field of vision and to rule out control and novelty as alternative explanations.¹ All participants were run individually by trained experimenters. Upon entering the experiment room, participants stood approximately 5 ft from a screen (wall-mounted television or large, external monitor) and were informed they would be watching either a 360-degree or VR ad, depending on the condition. In the 360-degree 2D conditions, a table with a computer mouse was placed next to their dominant hand (see Supplemental Materials for detailed set-up). In the VR condition, participants wore a VR head-mounted display (HMD) to view the appeal (see Supplemental Materials for product descriptions). Participants could explore the appeal by either using their mouse to shift their view (2D) or turning their heads while wearing the HMD (VR). Given the novelty of both formats, the experimenter provided instructions to help participants understand how to use the technology. Furthermore, the experimenter turned off all lights and left the room to minimize distractions and peripheral view in the 360-degree 2D condition. Participants first watched a neutral video to acclimate themselves to the technology, followed by the appeal. Upon completion, participants returned to their desks to complete study measures.²

2 Study 1: Smile Train

2.1 Participants

Two hundred ten undergraduates ($M_{age} = 21.2$, 48.1% female) from a large North American university completed the study in exchange for course credit and were assigned to one of two conditions (media type: VR vs. 360°-2D). One participant was excluded from analysis due to technical difficulties during their session.

¹ Using 360-degree 2D as the control condition (instead of passive/traditional 2D) provides a much more conservative test of our predictions as both formats are novel, immersive, and provide participant control over the experience. We would expect even larger effects had we used passive 2D.

² Study 3 followed slightly different viewing procedures. Changes are highlighted in Supplemental Materials.

2.2 Charitable appeal

The appeal was created by Smile Train, an international children's charity that provides free cleft lip repair surgery to children in developing nations. The appeal lasts approximately 5 min and chronicles the life of Nisha, a young girl from India who has a severe cleft lip. It details the difficult life she has led (e.g., being kept from school, social exclusion), and communicates her anxiety about the upcoming surgery. The appeal concludes by revealing the positive changes to her life after successful surgery, such as attending school and having friends.

2.3 Measures

2.3.1 Donations

While participants were away viewing the appeal, a lab assistant placed an envelope with \$5 at each participant's desk (five \$1 USD bills). The participant's lab ID was inconspicuously written inside the envelope to record donations. At the end of the study, participants learned the envelope at their desk contained \$5 as a thank you for completing the study. Participants were told the money was theirs to take but were given the option to donate to Smile Train. To donate, they could simply leave the amount they wished to donate in the envelope, and it would be privately collected. Individual donation amounts were recorded at the end of each session by a lab assistant. We made a donation to Smile Train commensurate with the donations collected (this is consistent across all studies). Our focal measure of interest in each of our studies is the average amount donated between VR and 360-degree 2D conditions.

2.3.2 Downstream support measures

Prior to the focal donation amount measure, we asked participants their likelihood of engaging in six downstream support behaviors (e.g., sign up for Smile Train's newsletter, visit their website) to examine other potential benefits of VR. These items showed acceptable reliability and were combined into a downstream support index ($\alpha = .87$). Several ancillary and demographic measures were also taken (we present focal measures in the manuscript for brevity, but provide all measures from all studies in the Supplemental Materials, and additional statistical information on outcome measures in Table 1).

2.4 Results and discussion

2.4.1 Donations

Because the donation dependent measure was a discrete count variable with a large proportion of zeros (49.5%), we conducted the analysis using a Generalized Linear Model with Poisson distribution and log link (Dobson & Barnett, 2008; McCullagh & Nelder,

1989).³ As predicted, participants who viewed the appeal in VR (vs. 360-degree 2D) donated significantly more money to the cause ($M_{VR} = \$2.19$, $SD = \$2.29$ vs. $M_{2D} = \$1.72$, $SD = \$2.21$; $\beta = -.24$, $\chi^2(1, N=202^4) = 5.64$, $p = .018$), demonstrating that VR can increase consumer donations over and above more traditional channels.

2.4.2 Downstream support measures

While directionally consistent with donation results, participants' intentions to support Smile Train in less-costly ways (e.g., subscribing to a newsletter) did not differ across conditions ($p = .167$). It is possible that an effect on additional support intention behaviors might exist, but we were unable to isolate it due to insufficient statistical power. We measure and find similar null results in study 2.

3 Study 2: National Autism Society

3.1 Participants

One hundred sixty-eight undergraduates from a large Canadian university ($M_{age} = 19.3$, 45.8% female) completed this study for course credit and were assigned to one of two conditions (media type: VR vs. 360-degree 2D). One participant was excluded from analysis due to technical difficulties during their session.

3.2 Charitable appeal

Study 2 utilizes an appeal produced by Great Britain's National Autism Society that lasts approximately 2 min. It was created to demonstrate how children with autism spectrum disorder (ASD) process information and experience sensory stimuli with greater intensity. The appeal is filmed from an 11-year-old child's perspective and takes place in a shopping mall in which the boy with ASD is waiting for his mother as she uses an automated teller machine (ATM). The appeal demonstrates the anxiety that typical shopping sounds (e.g., other shoppers, consumers dropping coins/drinks) can create for individuals with ASD.

3.3 Donation measure

As in study 1, participants received a \$5 bonus payment (five \$1 CAD coins). In this study, the bonus was given upon arrival (vs. at the end of the study) to ensure that

³ The GLM regression with a Poisson distribution is an appropriate analysis for this data because our DV is a discrete count variable, and contains a large proportion of zeroes across all studies (study 2: 26.4%; study 3: 48.4%). This analysis is supported both by statistical theory (Dobson & Barnett, 2008; McCullagh & Nelder, 1989) and consultation with statistical experts. However, for completeness, we report additional tests in the Supplemental Materials, all of which align with the focal analysis. This analysis method is used in all studies.

⁴ Eight participants were missing donation data.

participants felt ownership of the money. However, donations were still taken at the end of the session, following an identical procedure to study 1.

3.4 Results and discussion

3.4.1 Donations

Replicating the results of study 1, as predicted, participants who viewed the appeal in VR (vs. 360-degree 2D) donated significantly more money to the cause ($M_{VR} = \$3.49$, $SD = \$2.09$ vs. $M_{2D} = \$2.93$, $SD = \$2.42$; $\beta = -.18$, $\chi^2(N = 167^5) = 4.18$, $p = .041$). This result provides additional evidence that VR can increase donations compared to traditional channels. Moreover, VR's donation potential emerged among causes located outside of participant home countries.

4 Study 3: Hoedspruit Endangered Species Centre

4.1 Participants

One hundred twenty-three undergraduates ($M_{age} = 20.4$, 47.2% female) from a large North American university completed this study in exchange for \$5 and were assigned to one of two conditions (media type: VR vs. 360-degree 2D).

4.2 Charitable appeal

In this study, participants viewed an appeal for the Hoedspruit Endangered Species Centre, a nonprofit conservation organization located in South Africa. The appeal is approximately 1:45 min long and provides information about the organization and features a baby rhino named “Matimba,” drinking her morning bottle.

4.3 Measures

4.3.1 Donations

Before leaving the lab, participants were given the opportunity to donate their participation payment to the Endangered Species Centre and indicated their donation amount within the survey platform.⁶

⁵ One participant was missing donation information.

⁶ Unlike studies 1–2, participants received their full \$5 payment upon study completion regardless of indicated donation amount. Participants were unaware of this when making their donation decision. This procedural difference was made to align with IRB requirements regarding participant compensation. We also fulfilled the total donation based on participant donation decisions with additional funds.

Table 1 Statistical information on outcome measures

	Virtual reality	360-degree 2D	VR vs. 360-degree 2D	Effect size
Study 1 (N=210, 8 missing donation data)	<i>M</i>	<i>M</i>	Statistical test	β
Donation amount (<i>n</i> : VR = 113, 360-2D = 89)	\$ 2.19	\$ 1.72	$\chi^2 (N = 202) = 5.64, p = .018$	$\beta = -.24$
Percentage donating (<i>n</i> : VR = 113, 360-2D = 89)	55.75%	43.82%	$\chi^2 (N = 202) = 2.82, p = .093$	$\beta = .48$
Donation amount conditional on having donated (<i>n</i> : VR = 63, 360-2D = 39)	\$ 3.94	\$ 3.92	$F(1, 100) = 0.00, p = .967$	$\eta^2_p = .00$
Downstream support measures (<i>n</i> : VR = 118; 360-2D = 92)	4.78	4.51	$F(1, 208) = 1.92, p = .167$	$\eta^2_p = .01$
Study 2 (N=168)	Virtual reality	360-degree 2D	VR vs. 360-degree 2D	Effect size
Donation amount (<i>n</i> : VR = 87, 360-2D = 80)	<i>M</i>	<i>M</i>	Statistical test	β
Percentage donating (<i>n</i> : VR = 87, 360-2D = 80)	\$ 3.49	\$ 2.93	$\chi^2 (N = 167) = 4.18, p = .041$	$\beta = -.18$
Donation amount conditional on having donated (<i>n</i> : VR = 69, 360-2D = 54)	79.31%	67.50%	$\chi^2 (N = 167) = 2.96, p = .086$	$\beta = .61$
Downstream support measures (<i>n</i> : VR = 87; 360-2D = 81)	\$ 4.41	\$ 4.33	$F(1, 121) = .08, p = .773$	$\eta^2_p = .001$
Study 3 (N=123)	Virtual reality	360-degree 2D	VR vs. 360-degree 2D	Effect size
Donation amount (<i>n</i> : VR = 57, 360-2D = 66)	<i>M</i>	<i>M</i>	Statistical test	β
Percentage donating (<i>n</i> : VR = 57, 360-2D = 66)	\$ 1.53	\$ 0.95	$\chi^2 (N = 123) = 8.09, p = .004$	$\beta = -.48$
Donation amount conditional on having donated (<i>n</i> : VR = 42, 360-2D = 21)	63.64%	36.84%	$\chi^2 (N = 123) = 8.57, p = .003$	$\beta = 1.10$
Physical presence (<i>n</i> : VR = 57; 360-2D = 66)	\$ 2.40	\$ 2.57	$F(1, 61) = .17, p = .683$	$\eta^2_p = .003$
	5.65	4.13	$F(1, 121) = 36.78, p = .0001$	$\eta^2_p = .23$

4.3.2 Exploratory process measure

While our primary focus is documenting the positive effect of VR on donations, given that physical distance can impact charitable giving (Touré-Tillery & Fishbach, 2017), we measured feelings of physical presence (i.e., reduced physical distance) as a possible mechanism through which VR increases donations via three items (e.g., to what extent did it seem like the baby rhino was in the same physical space as you?; $\alpha = .92$, 1–7 scale).

4.4 Results and discussion

4.4.1 Donations

Replicating previous studies, participants who viewed the appeal in VR (vs. 360-degree 2D) donated significantly more money to the cause ($M_{VR} = \$1.53$, $SD = \$1.70$ vs. $M_{2D} = \$0.95$, $SD = \$1.52$, $\beta = -.48$, $\chi^2(N = 123) = 8.09$, $p = .004$). Thus, even for a positively valenced, low-intensity charitable appeal, consistent with our predictions, VR generated significantly higher donations.

4.4.2 Exploratory process measure

Results indicated that VR significantly affects feelings of physical presence ($M_{VR} = 5.65$, $SD = 1.31$ vs. $M_{2D} = 4.13$, $SD = 1.48$, $F(1,121) = 36.78$, $p < .0001$, $\eta_p^2 = .23$). However, feelings of being physically present did not mediate the relationship between media type and donations, suggesting the presence of other (likely multiple) underlying mechanisms operating in this charitable appeal context.

5 General discussion

Across three studies utilizing actual charitable appeals, multiple causes, and real donations, we find robust support for our prediction that VR (vs. 360-degree 2D) appeals can elicit higher donations—a novel empirical finding centered in a burgeoning new technology domain for marketing. This important finding also helps charitable marketers evaluating the potential ROI for VR advertising compared to more traditional appeals, and searching for ways to fundraise during a pandemic that requires virtual outreach to donors. Across all studies, VR increased donations 62%, 20%, and 61%, respectively, representing a substantial increase, especially in a domain where donations are the primary source of revenue. It is likely this increase in donations may be even *higher* when comparing VR to more traditional mediums (e.g., regular 2D/non-360-degree appeals, print ads, website). Charitable marketers can use this research to make better-informed decisions about whether the expected donation increase from VR ad appeals will offset the higher costs required to create them.

The current research also points to several fruitful areas for future research. First, researchers could examine the psychological processes operating in this emerging medium more directly. This research focused primarily on examining VR's potential to increase donations; thus, we are not able to make strong claims regarding the exact underlying processes through which VR is operating. However, we explored the intensity of the sensory experience as one potential factor contributing to the effectiveness of VR charitable appeals. Although VR research in marketing is limited, prior research has shown that the visual and auditory sensory experience of content viewed in VR is more intense compared to identical content viewed in traditional 2D (Lanier, 1992; Fox et al., 2009). This finding suggests that a persuasive charitable appeal viewed in VR (vs. 2D) will increase the intensity of the sensory experience. Given that charities often portray difficult social issues in their appeals that can arouse some emotional discomfort (e.g., Lee et al., 2014; Duclos & Barasch, 2014), heightening the intensity of the sensory experience in VR appeals could stimulate higher support. As such, we reasoned that this increased sensory experience may be one factor, among others, that increases VR's effectiveness.

Previous VR research in media studies and computer science has suggested that assessing internal processes in VR is challenging, and that real-time behavioral assessments may be better able to assess participant affective and cognitive experiences than retrospective survey instruments (e.g., Cummings & Bailenson, 2016). Thus, we conducted post-tests for each of the three appeals used in our studies to demonstrate the heightened sensory experience of VR over 2D. The post-test procedure was nearly identical to the main studies, but participants were video-recorded (with consent), and no measures were taken. Two trained coders, blind to the hypotheses, watched each video and independently rated participants' automatic physical response to the content (1 = no physical reaction, 9 = strong physical reaction), and overall observable reactions (face and body) to the appeal (1 = very low to 9 = very high). Consistent with our predictions, participants who viewed the appeals in VR (vs. 360-degree 2D) had more intense responses across all appeals (all $p < .001$, all $\eta_p^2 > .14$, see Supplemental Materials). In sum while the post-test results suggest the heightened sensory experience may play an important role in driving increased donations, multiple factors are likely operating and additional research is needed to provide deeper insight into the precise psychological mechanisms at play.

Second, although directionally in line with donations, we were unable to identify an effect on other, less-costly downstream support (e.g., signing up for a newsletter), likely due to our small sample size. It may be that an effect does exist (potentially smaller), but more power is needed to be sure. Alternatively, it could also be possible that support differs between donations and other types of support behaviors (e.g., Kristofferson et al., 2014; Kandaurova & Lee, 2019). Given the novel nature of this emerging tactic, our consistent effects on increased donations suggest the deployment of this emerging tactic may be best suited to campaigns dedicated to monetary fundraising. Future research could examine whether and how VR could be used to foster future donor engagement following donations (e.g., minimize attrition). Additionally, larger samples could be utilized in the future to examine the impact on other types of support.

Third, future research could examine the limits of VR's persuasiveness. We conducted a preliminary investigation of this possibility by examining extremely graphic "shock" appeals. Charities frequently address difficult, heart-wrenching social issues such as child poverty and malnourishment, and animal abuse (e.g., Lee et al., 2014; Duclos & Barasch, 2014). Although at times controversial, one approach charitable marketers have taken is designing appeals with shocking, extreme, graphic content to elicit negative affect and communicate the suffering many victims experience (Latour & Zahra, 1988; Fearn, 2013). These intense and graphic donation appeals are deliberately designed to shock and distress the viewer to garner more support, and can be very successful (Fearn, 2013). While research has demonstrated that negative affect can increase consumer support (e.g., Andreoni et al., 2017), we contend a point may exist at which the intensity of graphic, shocking, content may become too high for the viewer, resulting in reduced support and withdrawal as protection from negative feelings (Golman et al., 2017; Sternthal & Craig, 1974). Indeed, prior work examining traditional channels lends support for this prediction (e.g., Janis & Feshbach, 1953). Given that VR intensifies the sensory experience, we hypothesized that viewing shock appeals in VR may increase arousal past a processing threshold such that viewers withdraw from the appeal to cope, thereby reducing donations. To test the limitations of VR's persuasiveness, participants ($n = 114$) viewed a 4:30-min shock appeal that graphically depicted animal cruelty in the poultry industry (appeal tested and validated as significantly more intense and shocking compared to the appeals used in studies 1–3, see Supplemental Materials). We collected physiological GSR data to assess arousal intensity and donation behavior. Results revealed that whereas physiological arousal intensity was higher among participants who viewed the graphic appeal in VR ($p = .041$), donations were lower ($p = .019$) compared to 2D (full details in Supplemental Materials). Thus, while it may be tempting to employ this strategy to harness VR's intensity-amplification potential, producing this type of extreme appeal in VR over substantially less-costly, traditional options may be suboptimal for charitable marketers. This finding presents a fascinating opportunity for future research.

Fourth, while many processes that spur charitable giving rely on bolstering empathy toward a cause victim (e.g., Batson et al., 1997; Bagozzi & Moore, 1994), it is possible that VR, as a novel technology, impacts donor responses through a different path. For example, perhaps VR elicits the need for reciprocation, due to either the effort that participants intuit the organization put into creating the appeal, or for providing them with a more interesting experience. Prior research demonstrates that consumers reward firms for their effort (Morales, 2005), and VR might be a novel way to make effort more salient to potential donors. We took extreme care in designing our experimental paradigm to equate participant experiences across conditions, and to rule out alternative explanations. For example, we deliberately chose to use 360-degree 2D as our control condition both because it was also a novel tactic compared to passive commercial viewing, and to rule out participant control as an alternative explanation. That said, we cannot equivocally claim novelty is not also contributing to the observed pattern of effects.

Finally, additional research is needed to examine VR's effectiveness outside of the charitable giving domain. For instance, VR is frequently utilized for experiential

marketing in the hopes of increasing consumers' likelihood of engaging in the actual experience. Does VR actually increase interest in these experiences, or might it satiate consumers and reduce their likelihood of engaging in the "real deal" through a highly satisfying virtual experience? Future investigations should try to better understand and demonstrate the marketing consequences of the heightened sensory experience that VR offers consumers.

In conclusion, the present research takes an important first step toward understanding the potential implications that virtual reality technology can have for charitable marketers. This research addresses an emerging technology directly applicable to the immediate need of charitable marketers facing pandemic fundraising constraints. The results are timely and provide actionable insight. Using actual charitable appeals and real donations, we demonstrate the meaningful potential this emerging medium can have on increasing donations. We contribute theoretically to both the marketing and computer science literatures by demonstrating the persuasive consequences of VR, substantively by informing charitable marketers of VR's potential, and set the stage for future VR research regarding the marketing potential that this cutting-edge technology may offer.

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Availability of data and material Data and surveys available [here](#); all materials provided in Supplemental Materials Appendix.

Code availability SAS code available upon request.

Declarations

Ethics approval Ethics approval was obtained at Western University and Arizona State University.

Consent to participate All human participants consented to participate in the studies.

Consent for publication The authors consent to publish this manuscript.

Conflict of interest The authors declare no competing interests.

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