The Emotional Impact of Pictures when Crowdfunding for Healthcare: An Experimental Study

Andreas Blicher
Copenhagen Business School, abs.digi@cbs.dk

Rob Gleasure
Copenhagen Business School, rg.digi@cbs.dk

Ioanna Constantiou
Copenhagen Business School, ic.digi@cbs.dk

Jesper Clement
Department of Marketing, jc.marktg@cbs.dk

The Emotional Impact of Pictures when Crowdfunding for Healthcare: An Experimental Study

Completed Research Paper

Andreas Blicher
Department of Digitalization
Copenhagen Business School
abs.digi@cbs.dk

Rob Gleasure
Department of Digitalization
Copenhagen Business School
rg.digi@cbs.dk

Ioana Constantiou
Department of Digitalization
Copenhagen Business School
ic.digi@cbs.dk

Jesper Clement
Department of Marketing
Copenhagen Business School
jc.marktg@cbs.dk

Abstract

This study investigates how visual stimuli influence cancer-related charitable online giving. Particularly, the study investigates how different types of crowdfunding campaign pictures affect donors' decision to contribute to specific campaigns. We gathered crowdfunding campaigns from GoFundMe and divided them according to the main picture used in each campaign, i.e., cancer-related pictures vs. non-cancer-related pictures and pictures of individuals vs. pictures of groups. We then conducted an online experiment and a laboratory experiment using physiological measures. The results from the experiments show that cancer-related pictures receive more money and more immediate attention and arousal than non-cancer-related pictures. Furthermore, group pictures receive more money and more total attention than individual pictures. The physiological measures from the laboratory experiment provide valuable knowledge about the underlying emotional mechanisms involved in the donation process.

Keywords: Crowdfunding, Decision Making, Cancer, Online Experiment, Laboratory Experiment, NeuroIS, GoFundMe

Introduction

Most people will suffer from serious illness at some point in their lives, at which point they have to rely on others in society for help. Health systems are intended to cover most of these scenarios, yet there are times when individuals cannot access the care they need, for example because they cannot afford the treatments. These types of systematic gaps in public funding are often addressed, at last partly, by acts of charity (List, 2011). Notably, charitable crowdfunding has been shown to reduce rates of medical bankruptcy in vulnerable populations (Burtch & Chan, 2018). However, it is less clear whether charitable crowdfunding is actually providing support to those who most need it (Kenworthy & Igra, 2022).

It is not always obvious why people give money to others – others whom they may never meet or know. It has been suggested that charity is essentially irrational, and better explained with emotions (Genevsky et al., 2013). This appears especially likely for charitable crowdfunding, where donors may have limited access to the information needed for rational judgements. Hence, donors seem to rely on emotional judgements,

based on a range of heuristics and cognitive biases (Chen et al., 2016; Sasaki, 2019). These emotional judgements and biases in charitable behaviors often lead to the systematic misallocations of funds (Baron & Szymanska, 2011).

Thus, it appears that, while charitable crowdfunding may have the potential to address some of the inequalities in contemporary health systems (The Lancet Oncology, 2017; Young et al., 2017), it also has the potential to create new inequalities if we do not understand, and account for, donors' emotional decision-making processes and attentional biases. For this reason, multiple existing studies have studied the information that causes donors to contribute to specific healthcare crowdfunding campaigns. For example, Wu et al. (2022) found some evidence to suggest that a "gain-frame" was more likely to elicit contributions than a "loss-frame", and that positive emotion was more effective than negative emotion. In contrast, Zhang et al. (2021) found that negative emotions in project titles were linked with lower fundraising but negative emotions in project descriptions were linked with higher fundraising. Zhao et al. (2022) found that verbal sadness had a negative link with fundraising, however, this effect was mitigated by consistency between verbal and visual modalities.

Part of the challenge is that emotional responses and biases are also difficult to study with behavioral studies alone, where psychological elements must be inferred from limited cognitive measurement (Camerer, 1999). Making sense of these conflicting results thus requires that we triangulate behavioral observations with studies of individual cognition. Yet, this is challenging because these types of emotional processes and biases are difficult to study via self-report, as individuals may be unaware of them, or prone to social desirability biases in their responses (Dimoka et al., 2011; vom Brocke et al., 2013; Riedl et al., 2010; 2014). This paper therefore investigates health-related charitable giving using NeuroIS tools and theories.

We draw on neurobiological literature in two key areas. The first area is altruism. There is a range of evidence showing that human beings often make sacrifices to benefit others, even when there are no obvious selfish benefits in terms of kin selection, reciprocity, or reputation gains (see Nowak & Sigmund, 1998; Fehr & Gächter, 2002). These behaviors can be linked to evolved physiological and neurological mechanisms, several of which can be measured directly (Fehr & Rockenbach, 2004; Guerreiro et al., 2015).

The second body of neurobiological literature concerns emotion. In neurobiological terms, emotions can be defined as complex action programs triggered by the presence of certain external or internal stimuli. Attentional bias is selective attention to emotional stimuli presented at the same time as neutral stimuli (see Eysenck, 2014). Discrete emotion theory assumes that the basic emotions are mutually exclusive, each with different action programs, facial expressions, physiological processes, and accompanying cognitions. Dimensional models assume that emotions can be grouped and arranged along two or more dimensions. Most dimensional models use arousal (activating vs. calming emotions) as vertical axis and valence (positive vs. negative emotions) as horizontal axis. We use eye tracking to measure selective attention, galvanic skin response to measure emotional arousal, and facial expression analysis to measure emotional valence.

Previous research suggests that semantic content alone does not account for charitable giving, as neither negative nor positive text features are related to resource sharing - only photographs reveal a significant relationship between arousal and giving (Genevsky & Knutson, 2015). In the present study, we focus on the role of pictures in fundraising campaigns. Thus, we ask:

Q1: Which types of pictures are more likely to help charitable crowdfunding campaigns attract donations?

Q2: Which types of cognitive biases lead these pictures to attract more donations?

The next section provides a brief background on charitable crowdfunding and rationalistic theories of altruism, culminating in two research hypotheses. Next, we present an online experiment and a laboratory experiment that combines behavioral measures with measures of eye movements, skin conductance, and facial expressions. The results suggest campaigns attract more donors when they use pictures that depict illness and when they use pictures with multiple individuals.

Literature and Theory Development

Charitable crowdfunding

Crowdfunding platforms allow fundraisers to make open appeals for financial contributions from the public. Crowdfunding platforms operate on a spectrum between altruistically and strategically motivated (Berns et al., 2020). On the one end of the spectrum, fundraisers provide donors with repayment, equity, or valuable material rewards in exchange for their contribution. On the other end of the spectrum, fundraisers ask donors to contribute without promising any material or financial returns.

Altruism or pro-social motivations appears to play a role on most types of crowdfunding platforms. For example, Dai and Zhang (2019) showed that Kickstarter projects raise more money as they approach their fundraising target, particularly if those projects appeal to pro-social motivations. Similarly, Du et al. (2020) showed that recipients of peer-to-peer loans are more likely to repay their loans when reminded of lenders' positive expectations, while reminders of negative consequences for non-repayment have limited impact. Even in equity crowdfunding, certain investors may be more likely to invest in ventures with social benefits, such as those focused on sustainability (Vismara, 2019).

Perhaps unsurprisingly, it is charitable crowdfunding where research has observed most evidence of altruism (Bagheri et al., 2018; Gleasure & Feller, 2016, 2018; Liu et al., 2018; Snyder et al., 2017). These studies demonstrate the existence of altruism and social motivations in donors. However, the specific types of altruism, and the potential biases they enable, have received limited attention.

Scientific research has commonly explained the origins of altruism with three perspectives: *egoistic*, *egocentric*, and *altercentric* (Khalil, 2004). Seemingly, the least emotional and most selfishly rational of these three perspectives is the *egoistic*, which explains altruism by assuming actors foresee some expected social benefit, such as reciprocity or reputational gains. There are signs of reciprocity among donors to crowdfunding campaigns (Andre et al., 2017). However, the tendency for many contributors to hide their identity on charitable crowdfunding platforms and to give to individuals with whom the donor has little or no existing relationship suggests other motivations are also in effect. We therefore explore the *egocentric* and *altercentric* perspectives in more detail in the next sections.

Egocentric Altruism in Charitable Crowdfunding

The *egocentric* view of altruism suggests that individuals will help others because they participate in the resulting joy or alleviation of suffering or distress. This perspective relies on emotional contagion to explain helping or comforting behaviors (de Waal, 2008). Empathy allows people to relate to the emotional states of other people. Although cognition is often an important part of empathy, it is a secondary component. The primary component of empathy is that one person's emotional or arousal state affects another person (de Waal, 2008). This primary underlying emotional mechanism of empathy provides one person (the subject) with access to the subjective state of another person (the object) through the subject's own neural and bodily representations (Preston & de Waal, 2002).

Emotional contagion has been shown to occur via at least three mechanisms (Goldenberg & Gross, 2020). The first is mimicry, in which an emotional expression activates synchronous behavior on the part of the perceiver, which in turn activates affective processes (Barsade 2018; Hess, 2014). The second mechanism is category activation, in which exposure to emotional expressions primes an emotion category, which in turn leads to activation of specific emotional processes (Peters, 2015; Niedenthal, 2009). Finally, the third mechanism is social appraisal, in which individuals use the emotions of others as a guide for their own emotion appraisals, leading to similar emotional experiences (Manstead, 2001; Clément, 2017).

For these reasons, emotional contagion is often involuntary, meaning an individual will adopt the emotional state of another person without necessarily intending to do so (Kramer et al., 2014). These processes are nonetheless complex and interwoven with conscious evaluations and decision making. Notably, the psychological literature distinguishes sympathy from personal distress (de Waal, 2008). Personal distress makes the affected party selfishly seek to alleviate its own distress, a distress which mimics that of the object (Batson, 1991), while sympathy is defined as an affective response that consists of feelings of sorrow or concern for a distressed or needy other, with less emphasis on sharing the emotion of the other (Eisenberg, 2000).

These nuances become important when trying to compare and contrast the influence of positive and negative affect on charitable giving (Genevsky et al., 2013). On the one hand, a number of research findings reveal that negative affect evoked by empathic pain can increase charitable giving (Small & Verrochi, 2009; Hein et al., 2010; Masten et al., 2011). This suggests fundraising would be more effective if it focuses on the suffering of the person in need. On the other hand, a number of research findings reveal that positive affect (i.e., "warm glow") evoked by anticipation of giving can increase charitable behavior (Andreoni, 1990, 1995; Harbaugh et al., 2007). This suggests fundraisers should avoid focusing on the suffering of the person in need; instead highlighting the quality of life they hope to re-establish. While both are feasible, there is considerable evidence that negative emotion is a more powerful motivator of online behavior (see Stieglitz et al., 2013). Thus, we predict images that emphasize the negative state of the person in need will be more effective for fundraising.

H1: Charitable crowdfunding campaigns with a picture that depicts illness are more likely to attract donors than campaigns with a picture that does not.

Altercentric Altruism in Charitable Crowdfunding

The *altercentric* view of altruism suggests that individuals help others in need because they have evolved a pro-social trait or "moral gene" (Khalil, 2004). While this trait is a liability in *populations-sans-altruism* where altruism is rare, as the types of "heroes" who prioritize helping others will be out-competed by selfish individuals, it is advantageous in *populations-cum-altruism*, which can compete at a group-level (Samuelson, 1993). These group-level benefits reward the altercentric individuals because altruistic individuals tend to group together, and these groups are more successful than less altruistic groups. Altruism therefore occurs as a social norm, meaning altruistic individuals become more likely to engage in altercentric behaviors when they observe others helping each other (Terry & Hogg, 1996).

This type of altruism replaces the focus on emotional contagion in *egocentric* altruism with an attentional focus on social relations, not in the genetic sense but in the preference and recognition of some shared social and moral norms (Richerson & Boyd, 2001). This makes sense for charitable crowdfunding platforms, which are relatively easy to avoid for reactive and guilt-driven potential donors who would prefer to 'avoid the ask' (cf. Andreoni et al., 2017). Hence, these charitable crowdfunding platforms are often characterized by a shared moral imperative (Choy & Schlagwein, 2016; Gleasure & Feller, 2018).

This results in some confusion as to whether individuals or groups are more likely to elicit charitable giving. The egocentric view is supported by evidence that donors give more to a single identified victim than to large numbers of victims, as each donor finds it easier to empathize with an individual than a group (Slovic, 2007; Small & Loewenstein, 2003). This suggests fundraising should depict solely the person in need. However, the altercentric view suggests that donors will be more likely to give if they are given some signal that the person in need is part of a *population-cum-altruism*, suggesting fundraising should depict the person in a social context surrounded by pro-social others. The effectiveness of group images is supported by evidence that, despite donors' added difficulty in empathizing with a group rather than an individual, donors give more to large numbers of victims when these victims are perceived as entitative - comprising a single, coherent unit (Smith et al., 2013). This suggests fundraising should show the person in need along with others who also display shared social and moral norms, such as friends and/or family who are sharing the experience.

These alternative predictions are, once again, both feasible. The key differentiating criterion appears to be whether the additional attention paid by donors to social relations in group images will outweigh their decreased emotional response, when compared with images of individuals. Given the strong community element of charitable crowdfunding platforms, we predict the social orientation of donors will be particularly strong. Thus, we predict images with multiple individuals will sufficiently stimulate *altercentric* altruism to overcome any diminished emotional response.

H2: Charitable crowdfunding campaigns with a group image (a picture that depicts multiple individuals) are more likely to attract donors than campaigns with a picture that depicts a single individual.

Methods

Participants

Participants for the online experiment were recruited using Prolific (www.prolific.co). Data from 101 participants (M_{age} = 27.96, *SD* = 8.60; 44 female, 44%) has been collected. The online participants were all given £3.75 for their participation. Participants for the laboratory experiment were recruited at the authors' University. Data from 22 participants (M_{age} = 26.77, *SD* = 8.22; 14 female, 64%) has been collected. The laboratory participants were all given a movie ticket ($15) for their participation.

Measures

The crowdfunding task measures crowdfunding choices and contains 48 crowdfunding campaigns consisting of a picture and a text. The design is a 2 by 2 design with 4 treatments. The 4 treatments are: i) individual picture, ii) group picture, iii) cancer-related picture, and iv) non-cancer-related picture. On each trial, two crowdfunding campaigns are presented and the participant is asked to choose which campaign to support. Thus, the four possible combinations are i) individual cancer-related vs. group cancer-related, ii) individual non-cancer-related vs. group non-cancer-related, iii) individual cancer-related vs. individual non-cancer-related iv) group cancer-related vs. group non-cancer-related. The cancer-related pictures are all pictures taken in hospital settings and the non-cancer-related pictures are all pictures with no medical references. The experiment is created using Qualtrics software (www.qualtrics.com), with iMotions software (www.imotions.com) used to coordinate and integrate physiological measures. The crowdfunding campaigns are taken from the GoFundMe website (www.gofundme.com). Each crowdfunding campaign contains a picture and a text (100-200 words). The experiment contains real campaigns rather than fabricated campaigns to increase the ecological validity of the study. During the laboratory experiment, a Tobii Pro Nano records eye movements, a Shimmer3 GSR+ records skin conductance, and Affectiva records facial expressions.

Procedure

The procedure of the online experiment and the laboratory experiment are almost identical. However, the laboratory experiment also includes measures of eye movements, skin conductance, and facial expressions. Upon arrival at the laboratory the participant is given verbal and written information about the experiment. First, the shimmer is attached to the wrist of the non-dominant hand of the participant. Then, a two-minute baseline is conducted. No stimuli are presented during the baseline. Before the experiment, the participant is told "You are given $24 to donate to crowdfunding". However, "You can only support one of the two crowdfunding campaigns" and "Click on the donate button under the crowdfunding campaign you would like to support". The participant is told that "$1 is donated for every choice you make". The participant is then presented with 24 crowdfunding choices each containing two new options. Upon completion of the experiment, the participant is debriefed and thanked for the participation.

The eye-tracking data analysis was conducted on the first fixation duration data, the last fixation duration data, and the total fixation duration data, respectively. Areas of interest (AOIs) were created for each stimulus set. For each stimulus set two 450 x 255 px rectangles were created. The rectangles covered the pictures of the two crowdfunding campaigns presented on each trial. An I-VT fixation filter was created. The fixation filter parameters were: 20 ms window length, 30 degrees/second velocity threshold, 75 ms max gap length, 60 ms minimum fixation duration, 75 ms max time between fixations, and 0.5 degrees max angle between fixations. The first fixation duration data, the last fixation duration data, and the total fixation duration data were analyzed for each AOI.

The galvanic skin response data analysis was conducted on the number of peaks data. Peak detection of the first five seconds after stimulus onset were calculated for each stimulus set. The peak detection parameters were: 8000 ms phasic filter length, 5 Hz lowpass filter cutoff frequency, 0.01 microSiemens peak onset threshold, 0 microSiemens peak offset threshold, 0.005 microSiemens peak amplitude threshold, 500 ms minimum peak duration, and 4000 ms gap interpolation length threshold.

The facial expression data analysis was conducted on the negative valence data. Negative valence of the first five seconds after stimulus onset were calculated for each stimulus set. The translation from face features

into metrics was accomplished statistically, comparing the actual appearance of the face and the configuration of the features numerically with the normative database provided by the facial expression engine.

Results

Online Decision-making Data

A 2 × 2 analysis of variance (ANOVA) with cancer (cancer-related vs. non-cancer-related) and group (group vs. individual) as within-subject factors was conducted on the online decision-making data. The analysis revealed a significant main effect of cancer, $F(1, 100) = 75.25$, $p < .001$, $\eta^2 = .43$, and a significant main effect of group, $F(1, 100) = 8.72$, $p = .004$, $\eta^2 = .08$. The cancer × group interaction, $F(1, 100) = 3.22$, $p = .076$, $\eta^2 = .03$, did not reach significance. Post hoc dependent samples *t*-tests revealed a significant difference between individual cancer-related vs. individual non-cancer-related pictures, $t(100) = 8.85$, $p < .001$, $r = .66$, a significant difference between group cancer-related vs. group non-cancer-related pictures, $t(100) = 5.29$, $p < .001$, $r = .46$, and a significant difference between group non-cancer-related vs. individual non-cancer-related pictures, $t(100) = 2.55$, $p = .012$, $r = .25$. The difference between group cancer-related vs. individual cancer-related pictures, $t(100) = 1.83$, $p = .070$, $r = .18$, did not reach significance. The results suggest that more money were donated to the individual cancer-related ($M = 4.17$, $SD = 1.33$) compared to the individual non-cancer-related pictures ($M = 1.83$, $SD = 1.33$), more money were donated to the group cancer-related ($M = 3.79$, $SD = 1.51$) compared to the group non-cancer-related pictures ($M = 2.21$, $SD = 1.51$), and more money were donated to the group non-cancer-related ($M = 3.32$, $SD = 1.25$) compared to the individual non-cancer-related pictures ($M = 2.68$, $SD = 1.25$). More money were not donated to the group cancer-related ($M = 3.22$, $SD = 1.20$) compared to the individual cancer-related pictures ($M = 2.78$, $SD = 1.20$). Figure 1. illustrate the results of the online decision-making data.

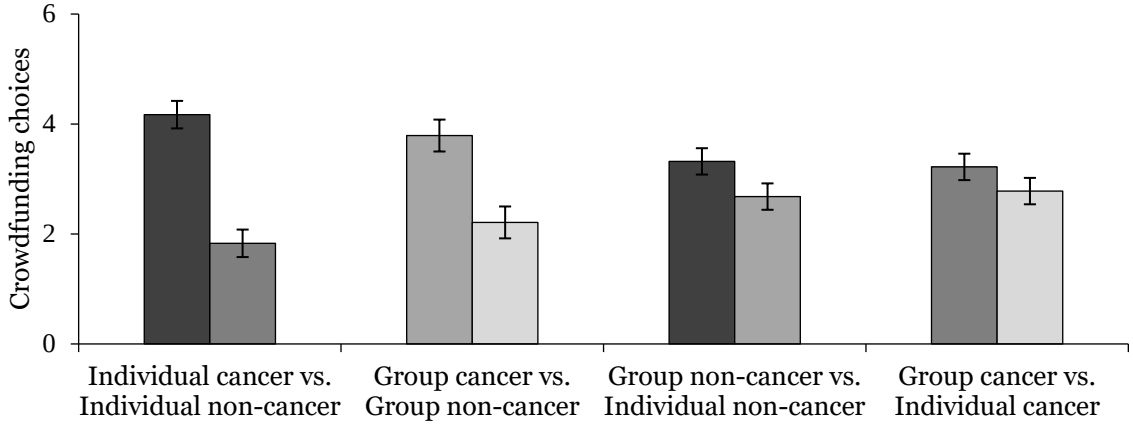

Figure 1. Illustration of the results of the online decision-making data. The figure shows the mean number of donations based on the characteristics of the crowdfunding campaign picture (n = 101).

Laboratory Decision-making Data

A 2 × 2 analysis of variance (ANOVA) with cancer (cancer-related vs. non-cancer-related) and group (group vs. individual) as within-subject factors was conducted on the laboratory decision-making data. The analysis revealed a significant main effect of cancer, $F(1, 21) = 134.54$, $p < .001$, $\eta^2 = .87$, and a significant main effect of group, $F(1, 21) = 6.13$, $p = .022$, $\eta^2 = .23$. The cancer × group interaction, $F(1, 21) = .40$, $p = .535$, $\eta^2 = .02$, did not reach significance. Post hoc dependent samples *t*-tests revealed a significant difference between individual cancer-related vs. individual non-cancer-related pictures, $t(21) = 10.80$, $p < .001$, $d = .92$, a significant difference between group cancer-related vs. group non-cancer-related pictures, $t(21) = 6.06$, $p < .001$, $d = .79$, and a significant difference between group non-cancer-related vs. individual non-cancer-related pictures, $t(21) = 2.27$, $p = .034$, $d = .44$. The difference between group cancer-related vs. individual cancer-related pictures, $t(21) = 2.03$, $p = .056$, $d = .40$, did not reach significance. The results suggest that more money were donated to the individual cancer-related ($M = 4.5$, $SD = 0.67$) compared to

the individual non-cancer-related pictures (M = 1.5, SD = 0.67), more money were donated to the group cancer-related (M = 4.2, SD = 0.98) compared to the group non-cancer-related pictures (M = 1.7, SD = 0.98), and more money were donated to the group non-cancer-related (M = 3.6, SD = 1.22) compared to the individual non-cancer-related pictures (M = 2.4, SD = 1.22). More money were not donated to the group cancer-related (M = 3.6, SD = 1.36) compared to the individual cancer-related pictures (M = 2.4, SD = 1.36). Figure 2. illustrate the results of the laboratory decision-making data.

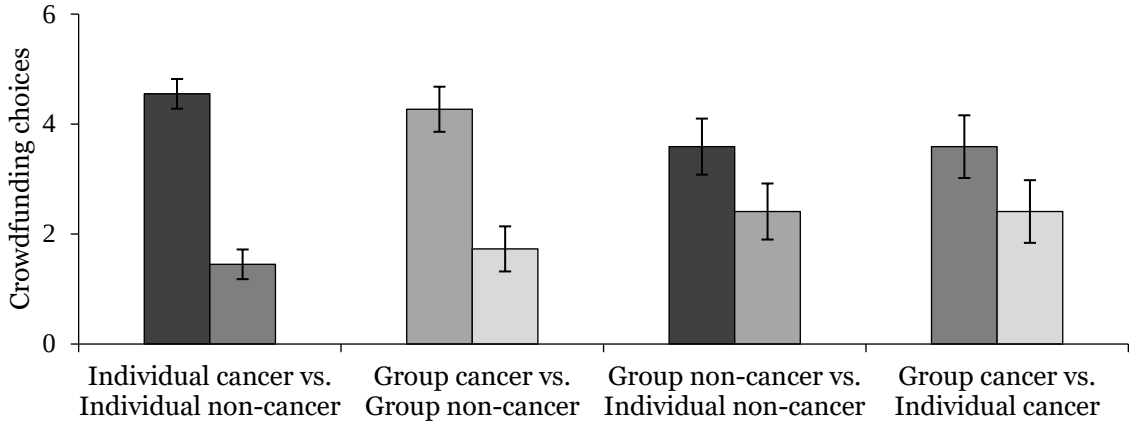

Figure 2. Illustration of the results of the laboratory decision-making data. The figure shows the mean number of donations based on the characteristics of the crowdfunding campaign picture (n = 22).

Eye-tracking Data

Three 2 × 2 analysis of variance (ANOVA) with cancer (cancer-related vs. non-cancer-related) and group (group vs. individual) as within-subject factors were conducted on the first fixation duration data, the last fixation duration data, and the total fixation duration data, respectively.

The first fixation duration analysis revealed a significant main effect of cancer, $F(1, 21) = 20.23$, $p < .001$, $\eta^2 = .49$, and a significant main effect of group, $F(1, 21) = 7.95$, $p = .010$, $\eta^2 = .28$. The cancer × group interaction, $F(1, 21) = 1.10$, $p = .306$, $\eta^2 = .05$, did not reach significance. The results suggest that the first fixation duration was longer for the cancer-related (M = 255.31, SD = 45.81) compared to the non-cancer-related pictures (M = 220.87, SD = 43.13), the first fixation duration was longer for the individual (M = 261.18, SD = 67.49) compared to the group pictures (M = 215.01, SD = 41.34).

The last fixation duration analysis revealed a significant main effect of group, $F(1, 21) = 37.02$, $p < .001$, $\eta^2 = .64$. The main effect of cancer, $F(1, 21) = 1.41$, $p = .248$, $\eta^2 = .06$, and the cancer × group interaction, $F(1, 21) = .05$, $p = .824$, $\eta^2 = .01$, did not reach significance. The results suggest that the last fixation duration was longer for the individual (M = 342.52, SD = 47.13) compared to the group pictures (M = 284.22, SD = 46.90). The last fixation duration was not longer for the cancer-related (M = 321.73, SD = 58.49) compared to the non-cancer-related pictures (M = 305.01, SD = 46.54).

The total fixation duration analysis revealed a significant main effect of group, $F(1, 21) = 82.06$, $p < .001$, $\eta^2 = .80$. The main effect of cancer, $F(1, 21) = .02$, $p = .898$, $\eta^2 = .01$, and the cancer × group interaction, $F(1, 21) = .53$, $p = .474$, $\eta^2 = .03$, did not reach significance. The results suggest that the total fixation duration was longer for the group (M = 2302.57, SD = 1059.22) compared to the individual pictures (M = 1551.02, SD = 810.58). The total fixation duration was not longer for the cancer-related (M = 1933.81, SD = 927.75) compared to the non-cancer-related pictures (M = 1919.79, SD = 984.99).

Galvanic Skin Response Data

A 2 × 2 × 2 analysis of variance (ANOVA) with cancer (cancer-related vs. non-cancer-related) and group (group vs. individual) and side (left vs. right) as within-subject factors were conducted on the number of peaks data. The analysis revealed a significant main effect of cancer, $F(1, 21) = 4.67$, $p = .042$, $\eta^2 = .18$. The main effect of group, $F(1, 21) = 1.09$, $p = .308$, $\eta^2 = .05$, the cancer × side interaction, $F(1, 21) = .04$, $p =$

.853, η^2 = .01, the group × side interaction, $F(1, 21)$ = .10, p = .747, η^2 = .01, and the cancer × group × side interaction, $F(1, 21)$ = .50, p = .485, η^2 = .02, did not reach significance. The results suggest that the number of peaks was higher for the cancer-related (M = 2.74, SD = 2.18) compared to the non-cancer-related pictures (M = 2.56, SD = 2.07). The number of peaks was not higher for the group (M = 2.70, SD = 2.20) compared to the individual pictures (M = 2.59, SD = 2.06).

Facial Expression Analysis Data

A 2 × 2 × 2 analysis of variance (ANOVA) with cancer (cancer-related vs. non-cancer-related) and group (group vs. individual) and side (left vs. right) as within-subject factors were conducted on the negative valence data. The negative valence analysis revealed no significant differences. The main effect of cancer, $F(1, 21)$ = .54, p = .469, η^2 = .03, the main effect of group, $F(1, 21)$ = .09, p = .812, η^2 = .01, the cancer × side interaction, $F(1, 21)$ = 3.27, p = .076, η^2 = .14, the group × side interaction, $F(1, 21)$ = .40, p = .535, η^2 = .02, and the cancer × group × side interaction, $F(1, 21)$ = .50, p = .485, η^2 = .02, did not reach significance. The results suggest that the negative valence was not higher for the cancer-related (M = 2.77, SD = 1.79) compared to the non-cancer-related pictures (M = 2.66, SD = 2.11), and the negative valence was not higher for the group (M = 2.74, SD = 1.95) compared to the individual pictures (M = 2.69, SD = 1.98).

Discussion

This work aims to present a deep analysis of health-related online fundraising that is conspicuously absent in existing literature. The physiological measures from the laboratory experiment provide valuable knowledge about the underlying emotional mechanisms involved in the donation process.

The results of the decision-making data from the online experiment and the laboratory experiment supported each other. Overall, the results of the decision-making data suggest that participants donated more money to crowdfunding campaigns with cancer-related pictures than with non-cancer-related pictures and crowdfunding campaigns with group pictures than with individual pictures. Thus, the results supported both of the hypotheses *H1* and *H2*.

The results from the laboratory experiment further provided support for the theoretical grounding of these hypotheses. *H1* predicted that cancer-related pictures would attract more donations because of egocentric altruism. This suggests that donors experience the suffering of the person in need because of involuntary empathetic pathways, and so the donor is motivated to alleviate that suffering. Eye-tracking data suggest that the participants' first fixation duration was longer for cancer-related pictures than for non-cancer-related pictures. Furthermore, the results of galvanic skin response data suggest that the participants' number of peaks during the first five seconds after stimulus onset was higher for crowdfunding campaigns with cancer-related pictures than for crowdfunding campaigns with non-cancer-related pictures. This implies that donors not only gave more to these campaigns, they also had a stronger emotional reaction to them.

H2 predicted that group pictures would attract more donations because of altercentric altruism. This suggests that donors give because they relate to altruistic social groups, meaning they are more inclined to give when they see a person in need in a social setting. Eye-tracking data from the laboratory experiment once again support this explanation. Participants' total fixation duration was longer for group pictures than for individual pictures. This suggests that, while these pictures did not provoke more emotional arousal than pictures of individuals, they did attract more attention. This implies that donors were more likely to inspect the person in need in a group picture at a relational-level, rather than just focusing on the specific person themselves.

Contributions to Health Literature

Online fundraising for healthcare has been a topic of both excitement and skepticism. Fundraising has focused on a range of needs, from funding healthcare institutions and charities, to healthcare research, to healthcare education, to commercial healthcare innovation (Renwick & Mossialos, 2017). Famous examples include the 'ice bucket challenge', which raised over $100 million for amyotrophic lateral sclerosis (ALS) (Vaidya, 2014). However, perhaps the most high profile examples have been the use of charitable crowdfunding platforms to fund healthcare treatments.

Some see this development as troubling, for example because it threatens how community health resources are allocated, because it creates new market norms that may commodify healthcare, or because subsequent consent-related decisions may be impaired by the promises made during fundraising (Dressler & Kelly, 2018). Others are concerned by the thread of fraud, with many publicized cases already demonstrating the vulnerability of donors to unscrupulous fundraisers (Zenone & Snyder, 2019). Others are concerned by the privacy-related sacrifices that individuals must make to fundraise in an open forum (Gonzales et al., 2018). More broadly, many healthcare and policy scholars are concerned that the public are simply not knowledgeable, experienced, or unbiased enough to make informed decisions about where to allocate scarce financial resources (Kenworthy et al., 2020).

These concerns are supported by observations that the most likely people to succeed in healthcare-related fundraising are not necessarily those who are most in need, but rather they are individuals with large social networks, a sympathetic story, or contacts in the media (Snyder et al., 2017). This supports the idea that donors are susceptible to a range of emotional influences that may limit the effectiveness of their contributions. Viewed in healthcare terms, this suggests a key objective for healthcare crowdfunding is to create a more level playing field for fundraisers.

The present study shows how the characteristics of the campaign picture have a powerful impact on the decision making process related to crowdfunding donations. While the use of cancer-related pictures or group pictures may only be one consideration for fundraisers, we link these pictures to fundamental drivers of altruistic response in donors to help unpack the decision-making process of donors. Thus, we contribute to the ongoing research of how the public makes informed decisions on charitable crowdfunding by increasing transparency of the campaign characteristics that influence the decision making process related to crowdfunding donations . We call for future research to build on these findings with ongoing critical reflection on the role of healthcare crowdfunding, including the types of information that may sway donors towards some campaigns over others.

Contributions to Altruism Literature

Online altruism makes for interesting comparison with the types of altruism described in most other settings (e.g., Nowak & Sigmund, 1998; Richerson & Boyd, 2001; Fehr & Gächter, 2002; Khalil, 2004). First, donations are often made anonymously (Burtch, et al., 2016) and to individuals that donors may not know personally (Greenberg & Mollick, 2017). This means that individuals often make decisions to help others without necessarily having an audience (onlookers or the fundraisers themselves) to observe their altruistic behaviors. Such conditions generally reduce altruism, as the donor is less subject to considerations of social desirability or potential reciprocity (Vorlaufer, 2019). Thus, in other contexts, a lack of audience increases free-riding among potential altruists, as each individual becomes more likely to wait for other people to contribute instead (Filiz-Ozbay & Ozbay, 2013). This is one of the reasons why individuals often make different altruist decisions in laboratory experiments when they are made “double-blind” (Hoffman et al., 1994). This raises questions whether some of the idiosyncrasies of online altruism, when compared with findings from economic altruism experiments for example, can be explained by the reduced experimenter oversight. However, the close consistency between the findings from our online and laboratory experiment challenge this explanation.

Second, it appears especially easy for individuals to ‘avoid the ask’ (Andreoni et al., 2017) when it comes to online altruism. This suggests individuals are unlikely to experience the types of ethical dissonance that often motivates ethical behavior, especially when individuals cannot rationalize away the guilt of not behaving ethically (Barkan et al., 2015). Following this, an intuitive assumption may be that donors are responding primarily to positive emotions. Our findings again challenge this explanation, as we found that donors were more likely to give when presented with cancer-related images.

Third, individuals engaging in online altruism have little means of ensuring that donations will actually be used as intended, or that the fundraiser will use the money that they raise effectively. In contexts such as blood donation, there is evidence that donors become more willing to contribute when they know they are donating to a credible and externally scrutinized recipient, such as the Red Cross (Eckel & Grossman, 1996). Fundraisers on charitable crowdfunding platforms like GoFundMe offer relatively minimal validation of the fundraiser, and instead entrust the donors to evaluate each campaign on its merits. Our results suggest that, in the absence of such information, donors rely on subconscious processes which can be related back to the core mechanisms of altruism.

Perhaps most interestingly, charitable crowdfunding appears to offers scholars of altruism a rare opportunity to study altruism with a minimum of rational self-interest present. Additionally, unlike many of the traditional settings for altruism research where donors are relatively passive – they are approached and presented with the 'ask' – donors on charitable crowdfunding platforms appear more proactive in their discovery and evaluation of fundraisers. We contribute to this research by showing specific campaign characteristics which become the focus of evaluations of donors.

This raises several interesting and important theoretical questions. One such question is whether positive and negative affect influence donors similarly in online and offline contexts, and whether these influences are linear in nature. The psychological literature distinguishes sympathy from personal distress (de Waal, 2008). Personal distress makes the affected party selfishly seek to alleviate its own distress, a distress which mimics that of the object (Batson, 1991), while sympathy is defined as an affective response that consists of feelings of sorrow or concern for a distressed or needy other, with less emphasis on sharing the emotion of the other (Eisenberg, 2000). Distress is presumably easier to escape online, as donors can choose to avoid the most unsettling of fundraisers. This suggests negative affect may possess an inverted U-shaped relationship with donations.

A further question is whether the stigma of asking for help (see Chase & Walker, 2013 for detailed discussion) persists in online settings. Most people prefer to ask for help through discrete channels, rather than show their vulnerability publicly. It is not clear whether the added visibility that an individual in need must endure in online contexts changes the dynamics for donors.

Contributions to Crowdfunding Literature

Crowdfunding has received extensive scholarly attention in the past decade. One of the frequent assumptions of crowdfunding is that it creates new fundraising opportunities for people with few other options (Mollick & Robb, 2016; Gleasure & Feller, 2016). Yet, this does not appear to be the case, with certain groups and individuals more likely to raise entrepreneurial finance (Cumming et al., 2021), artistic support (Galuszka & Brzozowska, 2017), and even medical donations, where demographic variables such as gender and race have been shown to influence fundraising (Kenworthy et al., 2020).

Addressing these inequalities requires, at least partly, that we are able to reduce some of the presentational discrepancies that may disproportionately influence donors (such as choosing which picture to include with a fundraiser). Such a change does not restrict donors' intentional or explicit bias, but it may help those donors who are subject to implicit bias to make more consciously aware decisions (see Holroyd, 2015). For medical crowdfunding, this means donors may make more calculated and balanced decisions about where to allocate their limited financial help. Our findings show specific campaign characteristics that influence donors' decision process and thus contributing towards more conscious decisions of donors.

The findings of this study support observations from other non-health contexts, such as microfinance (Pope & Syndor, 2011) and general charity appeals (Genevsky et al., 2013), that one significant source of potentially disproportionate influence in a health-related charitable crowdfunding campaign is the picture. Among other things, these pictures set a tone for campaigns and tell donors about the social setting for a person in need. Therefore, we need to understand if and how health-related charitable crowdfunding may be creating new gaps, particularly where donors rely on visual cues to trigger donations. This study provides a foundation for future work that may consider more presentational elements linked to theories of altruism. For example, proponents of 'effective altruism' (Singer, 2015) argue that donations should be given where they generate the maximum impact. This may mean pictures that appear more professional implicitly signal effort on the part of the fundraiser. More thorough study of these factors could result in a more equitable distribution of funds, and for the purposes of health-related charitable crowdfunding, a more socially inclusive health system.

Contributions to NeuroIS and HCI

This study demonstrates the value of applying physiological measures when studying online altruism. Altruistic behaviors are often characterized as irrational and emotional (Genevsky et al., 2013), and they are often subject to a range of unconscious influences (Oakley, 2013). This makes it difficult to infer motives and causation from behavioral measures of altruism, as these are likely influenced by hidden contextual factors. It also makes it difficult to rely upon self-reported measures, as these are often influenced by social

desirability considerations (Hall, 2001) or individuals' inability or unwillingness to recount contributing factors, such as empathy (Neumann et al., 2015).

These characteristics mean that NeuroIS can afford new, valuable theories and methods to better understand online altruism. This is because NeuroIS theories and tools provide direct physiological measurement to detect some of the unconscious processes that are missed by behavioral observation or self-reports (cf. Dimoka et al., 2012). NeuroIS tools may thus be used to triangulate behavioral data and support underlying causal theory building around online altruism, as we did in this study, or they may be used to explore unexpected behavioral or self-reported results and test alternative explanations. In addition to eye-tracking and galvanic skin response, this may include tools like electroencephalography (EEG) to test mental load and the timing of altruistic decisions – two factors that are known to interact with altruistic behaviors (Tinghög et al., 2016). Future research may also use functional magnetic resonance imaging (fMRI) to correlate networks of brain activation with specific decisions, for example to gauge the impact of guilt on altruistic giving (Basile et al., 2011).

Despite these opportunities, online altruism remains largely neglected by NeuroIS research. We believe this represents a promising convergence of fields for future research; one that could create positive social impacts in areas ranging from health to sustainability.

Limitations and Further Research

The results of the present study provide a valuable starting point to better understand donation behaviors on charitable crowdfunding platforms. However, they also raise some concerns about the generalizability of controlled experiments to actual crowdfunding platforms; platforms where many donors already have established relationships to those in need and much communication happens via other channels. Thus, this study is part of a series of experiments that shift the balance from controlled intervention to behavioral naturalism. More precisely, we have tested the same hypotheses with a quasi-experiment (Lazer et al., 2008) of observational data from GoFundMe, in which we gather a large dataset of campaigns and compare treatments using coarsened exact matching (Iacus et al., 2012). This allowed us to test whether the observed effects maintained a significant impact when other competing influences are present. The main limitation of both the online experiment and the laboratory experiment is ecological validity. An advantage of the quasi-experiment is that it has high ecological validity. However, a disadvantage of the quasi-experiment is that it does not control for the relationship between the donor and the recipient. If the donor knows the recipient, the effect of the campaign picture is likely diminished. The online experiment and the laboratory experiment from the present study control for this relationship.

A second limitation concerns the measures used in the laboratory experiment. That experiment includes measures of eye movements, skin conductance, and facial expressions. Galvanic skin response is an ideal measure to track emotional arousal. However, it is not able to reveal the emotional valence, that is, the quality of the emotions. The true power of skin conductance unfolds as it is combined with other sources of data to measure complex dependent variables and paint the full picture of emotional behavior. Facial expression analysis delivers valuable information on the quality of an emotional response, generally referred to as its valence. However, one core limitation of computer-based facial coding lies in its inability to assess someone's emotional arousal, that is, the intensity of an emotion. The results of the galvanic skin response data from the present study revealed a significant difference between crowdfunding campaigns with cancer-related pictures and crowdfunding campaigns with non-cancer-related pictures. However, the results of the facial expression analysis data revealed no significant differences. An explanation of this null finding may be that facial expressions are more voluntary than skin conductance. Consequently, the participants may be able to suppress facial expression responses but not skin conductance responses.

Conclusion

Overall, the results from the experiments show that cancer-related pictures receive more money and more immediate attention and arousal than non-cancer-related pictures. Furthermore, group pictures receive more money and more total attention than individual pictures. The physiological measures from the laboratory experiment provide valuable knowledge about the underlying emotional mechanisms involved in the donation process. These results help to explain some of the peculiarities of health-related charitable crowdfunding. They also provide a means to 'level the playing field' for those in need. If charitable

crowdfunding is to fill in the gaps in contemporary health systems, then campaign designers need to be aware of donor biases. Otherwise, oversights and gaps will persist, based on disproportionately influential decisions like which picture to use for a fundraiser, and donations will be less likely to make it those who need it most.

Acknowledgements

The authors wish to acknowledge the Carlsberg Foundation, grant number CF20-0254, and everyone who participated in the study.

Author Note

A shorter version of the study has been accepted at the NeuroIS Retreat 2022. That version does not include the online experiment and much of the theoretical discussion.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

The study was approved by the institutional review board and was carried out in accordance with the provisions of the World Medical Association Declaration of Helsinki.

References

Andreoni, J. (1990). Impure altruism and donations to public goods: A theory of warm-glow giving. *The Economic Journal*, 100(401), 464-477.

Andreoni, J. (1995). Warm-glow versus cold-prickle: the effects of positive and negative framing on cooperation in experiments. *The Quarterly Journal of Economics*, 110(1), 1-21.

Andreoni, J., Rao, J. M., & Trachtman, H. (2017). Avoiding the ask: A field experiment on altruism, empathy, and charitable giving. *Journal of Political Economy*, 125(3), 625-653.

André, K., Bureau, S., Gautier, A., & Rubel, O. (2017). Beyond the opposition between altruism and self-interest: Reciprocal giving in reward-based crowdfunding. *Journal of Business Ethics*, 146(2), 313-332.

Bagheri, A., Chitsazan, H., & Ebrahimi, A. (2019). Crowdfunding motivations: A focus on donors' perspectives. *Technological Forecasting and Social Change*, 146, 218-232.

Barkan, R., Ayal, S., & Ariely, D. (2015). Ethical dissonance, justifications, and moral behavior. *Current Opinion in Psychology*, 6, 157-161.

Baron, J., & Szymanska, E. (2011). Heuristics and Biases in Charity. In *The Science of Giving: Experimental Approaches to the Study of Charity*, D. M. Oppenheimer and C. Y. Olivola (Eds.), New York: Taylor & Francis Group, pp. 215-236.

Barsade, S. G., Coutifaris, C. G., & Pillemer, J. (2018). Emotional contagion in organizational life. *Research in Organizational Behavior*, 38, 137-151.

Basile, B., Mancini, F., Macaluso, E., Caltagirone, C., Frackowiak, R. S., & Bozzali, M. (2011). Deontological and altruistic guilt: evidence for distinct neurobiological substrates. *Human Brain Mapping*, 32(2), 229-239.

Batson, C. D. (1991). *The Altruism Question: Toward a social-psychological answer*. Hillsdale, New Jersey: Erlbaum.

Berns, J. P., Figueroa-Armijos, M., da Motta Veiga, S. P., & Dunne, T. C. (2020). Dynamics of lending-based prosocial crowdfunding: Using a social responsibility lens. *Journal of Business Ethics*, 161(1), 169-185.

Burtch, G., & Chan, J. (2018). Investigating the relationship between medical crowdfunding and personal bankruptcy in the United States: Evidence of a digital divide. *MIS Quarterly*, 43(1), 237-262.

Burtch, G., Ghose, A., & Wattal, S. (2016). Secret admirers: An empirical examination of information hiding and contribution dynamics in online crowdfunding. *Information Systems Research*, *27*(3), 478-496.

Camerer, C. (1999). Behavioral economics: Reunifying psychology and economics. *Proceedings of the National Academy of Sciences*, 96(19), 10575-10577.

Chase, E., & Walker, R. (2013). The co-construction of shame in the context of poverty: Beyond a threat to the social bond. *Sociology*, 47(4), 739-754. https://doi.org/10.1177%2F0038038512453796

Chen, S., Thomas, S., & Kohli, C. (2016). What really makes a promotional campaign succeed on a crowdfunding platform? Guilt, utilitarian products, emotional messaging, and fewer but meaningful rewards drive donations. *Journal of Advertising Research*, 56(1), 81-94.

Choy, K., & Schlagwein, D. (2016). Crowdsourcing for a better world: On the relation between IT affordances and donor motivations in charitable crowdfunding. *Information Technology & People*, 29(1), 21-247.

Clément, F., & Dukes, D. (2017). Social appraisal and social referencing: Two components of affective social learning. *Emotion Review*, 9(3), 253-261.

Cumming, D., Meoli, M., & Vismara, S. (2021). Does equity crowdfunding democratize entrepreneurial finance? *Small Business Economics*, 56(2), 533-552.

Dai, H., & Zhang, D. J. (2019). Prosocial goal pursuit in crowdfunding: Evidence from Kickstarter. *Journal of Marketing Research*, 56(3), 498-517.

de Waal, F. B. (2008). Putting the altruism back into altruism: the evolution of empathy. *Annual Review of Psychology*, 59, 279-300.

Dimoka, A., Davis, F. D., Gupta, A., Pavlou, P. A., Banker, R. D., Dennis, A. R., ... & Weber, B. (2012). On the use of neurophysiological tools in IS research: Developing a research agenda for NeuroIS. *MIS Quarterly*, 36(3), 679-702.

Dimoka, A., Pavlou, P. A., & Davis, F. D. (2011). Research commentary—NeuroIS: The potential of cognitive neuroscience for information systems research. Information Systems Research, 22(4), 687-702.

Dressler, G., & Kelly, S. A. (2018). Ethical implications of medical crowdfunding: the case of Charlie Gard. *Journal of Medical Ethics*, 44(7), 453-457.

Du, N., Li, L., Lu, T., & Lu, X. (2020). Prosocial compliance in P2P lending: A natural field experiment. *Management Science*, 66(1), 315-333.

Eckel, C. C., & Grossman, P. J. (1996). Altruism in anonymous dictator games. *Games and Economic Behavior*, 16(2), 181-191.

Eisenberg N. (2000). Empathy and sympathy. In *Handbook of Emotion*, M. Lewis & J. M. Haviland-Jones, pp. 677–91. New York: Guilford.

Eysenck, M. (2014). *Anxiety and cognition: A unified theory*. Psychology Press.

Fehr, E., & Fischbacher, U. (2002). Why social preferences matter–the impact of non-selfish motives on competition, cooperation and incentives. *The Economic Journal*, 112(478), C1-C33.

Fehr, E., & Gächter, S. (2002). Altruistic punishment in humans. Nature, 415(6868), 137-140.

Fehr, E., & Rockenbach, B. (2004). Human altruism: economic, neural, and evolutionary perspectives. *Current Opinion in Neurobiology*, 14(6), 784-790.

Filiz-Ozbay, E., & Ozbay, E. Y. (2014). Effect of an audience in public goods provision. *Experimental Economics*, 17(2), 200-214.

Galuszka, P., & Brzozowska, B. (2017). Crowdfunding and the democratization of the music market. *Media, Culture & Society,* 39(6), 833-849.

Genevsky, A., & Knutson, B. (2015). Neural affective mechanisms predict market-level microlending. *Psychological Science*, 26(9), 1411-1422.

Genevsky, A., Västfjäll, D., Slovic, P., & Knutson, B. (2013). Neural underpinnings of the identifiable victim effect: Affect shifts preferences for giving. *Journal of Neuroscience*, 33(43), 17188-17196.

Gleasure, R., & Feller, J. (2016). Does heart or head rule donor behaviors in charitable crowdfunding markets? *International Journal of Electronic Commerce*, 20(4), 499-524.

Gleasure, R., & Feller, J. (2018). What kind of cause unites a crowd? Understanding crowdfunding as collective action. *Journal of Electronic Commerce Research*, 19(3), 223-236.

Gonzales, A. L., Kwon, E. Y., Lynch, T., & Fritz, N. (2018). "Better everyone should know our business than we lose our house": Costs and benefits of medical crowdfunding for support, privacy, and identity. *New Media & Society*, 20(2), 641-658.

Goldenberg, A., & Gross, J. J. (2020). Digital emotion contagion. *Trends in Cognitive Sciences*, 24(4), 316-328.

Greenberg, J., & Mollick, E. (2017). Activist choice homophily and the crowdfunding of female founders. *Administrative Science Quarterly*, 62(2), 341-374.

Guerreiro, J., Rita, P., & Trigueiros, D. (2015). Attention, emotions and cause-related marketing effectiveness. *European Journal of Marketing*, 49(11/12), 1725-1750.

Hall, M. H. (2001). Measurement issues in surveys of giving and volunteering and strategies applied in the design of Canada's national survey of giving, volunteering and participating. *Nonprofit and Voluntary Sector Quarterly*, 30(3), 515–526.

Harbaugh, W. T., Mayr, U., & Burghart, D. R. (2007). Neural responses to taxation and voluntary giving reveal motives for charitable donations. *Science*, 316(5831), 1622-1625.

Hein, G., Silani, G., Preuschoff, K., Batson, C. D., & Singer, T. (2010). Neural responses to ingroup and outgroup members' suffering predict individual differences in costly helping. *Neuron*, 68(1), 149-160.

Hess, U., & Fischer, A. (2014). Emotional mimicry: Why and when we mimic emotions. *Social and Personality Psychology Compass*, 8(2), 45-57.

Hoffman, E., McCabe, K., Shachat, K., & Smith, V. (1994). Preferences, property rights, and anonymity in bargaining games. *Games and Economic Behavior*, 7(3), 346-380.

Holroyd, J. (2015). Implicit bias, awareness and imperfect cognitions. *Consciousness and Cognition*, 33, 511-523.

Iacus, S. M., King, G., & Porro, G. (2012). Causal inference without balance checking: Coarsened exact matching. *Political Analysis*, 20(1), 1-24.

Kenworthy, N., Dong, Z., Montgomery, A., Fuller, E., & Berliner, L. (2020). A cross-sectional study of social inequities in medical crowdfunding campaigns in the United States. *PLoS One*, 15(3), e0229760.

Kenworthy, N., & Igra, M. (2022). Medical Crowdfunding and Disparities in Health Care Access in the United States, 2016–2020. *American Journal of Public Health*, 112(3), 491-498.

Khalil, E. L. (2004). What is altruism? *Journal of Economic Psychology*, 25(1), 97-123.

Kramer, A. D., Guillory, J. E., & Hancock, J. T. (2014). Experimental evidence of massive-scale emotional contagion through social networks. *Proceedings of the National Academy of Sciences*, 111(24), 8788-8790.

Manstead, A. S., & Fischer, A. H. (2001). Social appraisal. In *Appraisal processes in emotion: Theory, methods, research*, K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), Oxford University Press, London, pp. 221-232.

Masten, C. L., Morelli, S. A., & Eisenberger, N. I. (2011). An fMRI investigation of empathy for 'social pain' and subsequent prosocial behavior. *Neuroimage*, 55(1), 381-388.

Mollick, E., & Robb, A. (2016). Democratizing innovation and capital access: The role of crowdfunding. *California Management Review*, 58(2), 72-87.

Niedenthal, P. M., Winkielman, P., Mondillon, L., & Vermeulen, N. (2009). Embodiment of emotion concepts. *Journal of Personality and Social Psychology*, 96(6), 1120.

Lazer, D., Pentland, A., & Adamic, L. (2008). Social science. Computational social science. *Science*, 323(5915), 721-723.

Liu, L., Suh, A., & Wagner, C. (2018). Empathy or perceived credibility? An empirical study on individual donation behavior in charitable crowdfunding. *Internet Research*, 28(3), 623-651.

List, J. A. (2011). The market for charitable giving. *Journal of Economic Perspectives*, 25(2), 157-80.

Neumann, D. L., Chan, R. C., Boyle, G. J., Wang, Y., & Westbury, H. R. (2015). Measures of empathy: Self-report, behavioral, and neuroscientific approaches. In G. J. Boyle, D. H. Saklofske, and G. Matthews (Eds.), *Measures of personality and social psychological constructs*, pp. 257-289.

Nowak, M. A., & Sigmund, K. (1998). Evolution of indirect reciprocity by image scoring. *Nature*, 393(6685), 573-577.

Oakley, B. A. (2013). Concepts and implications of altruism bias and pathological altruism. *Proceedings of the National Academy of Sciences*, 110(Supplement 2), 10408-10415.

Peters, K., & Kashima, Y. (2015). A multimodal theory of affect diffusion. *Psychological Bulletin*, 141(5), 966.

Pope, D. G., & Sydnor, J. R. (2011). What's in a picture? Evidence of discrimination from prosper.com. *Journal of Human Resources*, 46(1), 53–92.

Preston, S. D., & de Waal, F. B. (2002). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences*, 25(1), 1-20.

Renwick, M. J., & Mossialos, E. (2017). Crowdfunding our health: economic risks and benefits. *Social Science & Medicine*, 191, 48-56.

Richerson, P. J., & Boyd, R. (2001). The evolution of subjective commitment to groups: A tribal instincts hypothesis. In R. M. Nesse (Ed.), *Russell Sage Foundation series on trust: Vol. III. Evolution and the capacity for commitment* (pp. 186–220). New York: Russell Sage Foundation.

Riedl, R., Banker, R. D., Benbasat, I., Davis, F. D., Dennis, A. R., Dimoka, A., Gefen, D., Gupta, A., Ischebeck, A., Kenning, P., Müller-Putz, G., Pavlou, P. A., Straub, D. W., vom Brocke, J., & Weber, B. (2010a). On

the foundations of NeuroIS: Reflections on the Gmunden Retreat 2009. *Communications of the Association for Information Systems*, 27, 243-264.
Riedl, R., Davis, F. D., & Hevner, A. R. (2014). Towards a NeuroIS research methodology: intensifying the discussion on methods, tools, and measurement. *Journal of the Association for Information Systems*, 15(10), i-xxxv.
Samuelson, P. A. (1993). Altruism as a problem involving group versus individual selection in economics and biology. *The American Economic Review*, 83(2), 143-148.
Sasaki, S. (2019). Majority size and conformity behavior in charitable giving: Field evidence from a donation-based crowdfunding platform in Japan. *Journal of Economic Psychology*, 70, 36-51.
Singer, P. (2015). *The most good you can do: How effective altruism is changing ideas about living ethically*. New Haven, CT: Yale University Press.
Slovic, P. (2007). If I look at the mass I will never act: Psychic numbing and genocide. *Judgment and Decision Making*, 2(2), 1-17.
Small, D. A., & Loewenstein, G. (2003). Helping a victim or helping the victim: Altruism and identifiability. *Journal of Risk and Uncertainty*, 26(1), 5-16.
Small, D. A., & Verrochi, N. M. (2009). The face of need: Facial emotion expression on charity advertisements. *Journal of Marketing Research*, 46(6), 777-787.
Smith, R. W., Faro, D., & Burson, K. A. (2013). More for the many: The influence of entitativity on charitable giving. *Journal of Consumer Research*, 39(5), 961-976.
Snyder, J., Crooks, V. A., Mathers, A., & Chow-White, P. (2017). Appealing to the crowd: ethical justifications in Canadian medical crowdfunding campaigns. *Journal of Medical Ethics*, 43(6), 364-367.
Stieglitz, S., & Dang-Xuan, L. (2013). Emotions and information diffusion in social media—sentiment of microblogs and sharing behavior. *Journal of Management Information Systems*, 29(4), 217-248.
Terry, D. J., & Hogg, M. A. (1996). Group norms and the attitude-behavior relationship: A role for group identification. *Personality and Social Psychology Bulletin*, 22(8), 776-793.
The Lancet Oncology (2017). Mind the gap: charity and crowdfunding in health care. *The Lancet Oncology,* 18(3), 269.
Tinghög, G., Andersson, D., Bonn, C., Johannesson, M., Kirchler, M., Koppel, L., & Västfjäll, D. (2016). Intuition and moral decision-making–the effect of time pressure and cognitive load on moral judgment and altruistic behavior. *PloS one*, 11(10), e0164012.
Vaidya, M. (2014). Ice bucket challenge cash may help derisk ALS drug research. Nature, 201(4), 1080.
Vismara, S. (2019). Sustainability in equity crowdfunding. *Technological Forecasting and Social Change*, 141, 98-106.
vom Brocke, J., Riedl, R., & Léger, P.-M. (2013). Application strategies for neuroscience in information systems design science research. *Journal of Computer Information Systems*, 53(3), 1-13.
Vorlaufer, T. (2019). Effects of double-anonymity on pro-and anti-social behavior: Experimental evidence from a lab in the field. *Journal of Behavioral and Experimental Economics*, 81, 216-225.
Wu, Y., Zhang, X., & Xiao, Q. (2022). Appeal to the head and heart: The persuasive effects of medical crowdfunding charitable appeals on willingness to donate. *Information Processing & Management*, 59(1), 102792.
Young, M. J., & Scheinberg, E. (2017). The rise of crowdfunding for medical care: promises and perils. *JAMA*, 317(16), 1623-1624.
Zenone, M., & Snyder, J. (2019). Fraud in medical crowdfunding: A typology of publicized cases and policy recommendations. *Policy & Internet*, 11(2), 215-234.
Zhang, F., Xue, B., Li, Y., Li, H., & Liu, Q. (2021). Effect of Textual features on the success of medical crowdfunding: model development and Econometric analysis from the Tencent charity platform. *Journal of Medical Internet Research*, 23(6), e22395.
Zhao, K., Zhou, L., & Zhao, X. (2022). Multi-modal emotion expression and online charity crowdfunding success. *Decision Support Systems*, forthcoming, available at https://doi.org/10.1016/j.dss.2022.113842.