DIRECT GAZE, STORY NARRATION, AND ONLINE MEDICAL CROWDFUNDING OUTCOMES

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ABSTRACT

The success rate for online medical crowdfunding (MCF) is low despite its prevalence and significance, and certain groups manifest low use efficacy of such emerging platforms. While many factors could account for this, we focus on two subtle campaign design features – visual cue (direct gaze) and textual cues (narrativity), and explore if and how they influence campaign success. We focus on these subtle features because they are in the direct control of the fundraisers, are hence easy to manipulate, and are independent of medical issues, and go beyond the socioeconomic frictions that typically inhibit medical crowdfunding success. We synthesize Objective Self-Awareness (OSA) theory and Transportation theory to explore how visual and textual cues in medical crowdfunding campaigns independently and interactively influence outcomes. We test our research model using a unique dataset with 59k MCF campaigns from the GoFundMe platform in the U.S. during 2017-2019. Leveraging computer vision techniques we extract interpretable gaze cues from campaign images and using text mining we extract information from campaign texts, to measure narrativity in terms of its underlying dimensions (temporality, spatiality, and cognitive tension)and classify medical conditions (22 categories based on ICD-11 released by WHO). We find that the presence of direct gaze (i.e., inducing self-image concern) and high degree of narrativity (i.e., the use of narrative persuasion) increase MCF outcomes. Furthermore, the presence of direct gaze attenuates the differential benefits of narrativity, specifically, in term of temporality, but not significantly in terms of spatiality and

cognitive tension. Our findings have managerial implications for the better design of a MCF campaign to solicit more help and shed light on the potential negative synergies (crowding-out effects) when combining visual (or nonverbal social) and textual design features.

Keywords: Online Medical Crowdfunding, Direct Gaze, Narrative Persuasion, Crowding-out Effect, Unstructured Data

INTRODUCTION

Online medical crowdfunding (i.e., online campaigns to finance personal healthcare-related expenses from the crowds, MCF) makes up the largest and fastest-growing segment of donation-based crowdfunding, fueled by both the affordance of digital technology (crowdfunding platform) and the gaps in healthcare safety nets. Institutional safety nets often fail and are slow to improve. A decade of health insurance surveys reveal that more than 43 percent of working-age American adults had inadequate health insurance, creating affordability crisis in American health care[1]. Many turn to the crowds for help to maintain their resilience during a medical crisis. From 2010 through 2018, 26.7 percent of campaigns on the GoFundMe platform (the largest online crowdfunding platform in U.S.) were for medical causes; and those MCF campaigns sought a collective total of nearly $10.3 billion and raised about $3.7 billion (Angraal et al., 2021). According to the 2020 health survey[2], an estimated 20 million Americans have started a MCF campaign for themselves or others. MCF activities have socio-economic impacts

[1]2020 Biennial Health Insurance Coverage Survey from The Commonwealth Fund. https://www.commonwealthfund.org/publications/issue-briefs/2020/aug/looming-crisis-health-coverage-2020-biennial, accessed on 6/5/2022.
[2]2020 Health Survey from NORC the University of Chicago. https://www.norc.org/NewsEventsPublications/PressReleases/Pages/millions-of-americans-donate-through-crowdfunding-sites-to-help-others-pay-for-medical-bills.aspx, accessed on 4/23/2021.

such as reducing the rate of personal bankruptcy (Burtch & Chan, 2019). The significance of MCF is evident when individuals are going through personal health and financial crisis, and it becomes even more profound when overlapped with other social crises such as the Covid-19 pandemic.

Despite its prevalence and significance, the success rate for MCF is low and certain groups manifest low use efficacy of such emerging platforms. 90 percent of MCF campaigns did not reach their financial goal according to a randomized sample of GoFundMe medical campaigns in 2016 (Berliner & Kenworthy, 2017). The success of online crowdfunding campaigns is associated with many factors. Among them, frictions in the extended interactions have attracted scholars' attention in the IS literature, for example, fundraiser's social network (Belleflamme et al., 2014; D. Liu et al., 2015; Mollick, 2014), demographic characteristics such as geographic and cultural difference (Burtch et al., 2014; Lin & Viswanathan, 2016), literacy ability to articulate the semantic topics (Yuan et al., 2016), and marketing efforts to engage with the campaign dynamics (Burtch et al., 2019). However, those frictions are hard or slow to alleviate by fundraisers, and concerns on benefit inequities are documented recently (Burtch & Chan, 2019; Igra et al., 2021; Van Duynhoven et al., 2019).

Beyond those hard-to-change factors, to what extent the design features, such as the visual cues and textual cues, of crowdfunding campaign impact the campaign outcomes, are poorly understood. Since a cover image plus story narrations in the text is the typical template to craft a crowdfunding post on online platforms, we investigate two design features of the campaign – characters' gaze direction in the image and story narrativity of the text. Managerially, using these subtle design features is a low-cost yet powerful tool that, if used properly, can efficiently enhance the chance of success in medical crowdfunding campaign. This

is because both design features are under direct control of fundraisers, can be independent of inherent medical issues, go beyond socio-economic and geographic frictions, and precede the information cascade dynamics in social influence and marketing efforts. Therefore, understanding the impacts of gaze direction and story narrativity and their interactions can help to alleviate the benefit inequities in medical crowd funding caused by fundraisers' social, economic, geographic, and cultural frictions.

Theoretically, crowdfunding scholars have started to examine the role of textual features such as language usage (Anglin et al., 2018; Parhankangas & Renko, 2017) and visual features (Mahmood et al., 2019) in reward-based and equity-based crowdfunding performance. Further, evidence showing that mere exposure to subtle factors such as gaze direction cues and narrative framing impact peoples' perceptions and choices has been well documented (Driver IV et al., 1999; Duval & Wicklund, 1972; Friesen & Kingstone, 1998; Green et al., 2004; Green & Brock, 2000). However, it is not immediately evident how these design features interact to impact campaign outcomes and there is limited research examining how to design an effective crowdfunding campaign by considering the combination of both visual social cues and textual cues, especially in the medical crowdfunding context. That's why we are motivated to conduct a systematic study on the role of subtle design features across visual and textual modality on the MCF outcomes.

We synthesize Objective Self-Awareness (OSA) theory (Duval and Wicklund 1972) and Transportation theory (Green et al. 2004; Green and Brock 2000) into an information processing framework and develop a research model on the role of subtle cues. Specifically, we examine the economic impact of two new features of campaign design – direct gaze (a type of visual cues) and narrativity (a type of textual cues), and their plausible interactions on MCF outcomes. Gaze

direction cue in the image is a type of visual cue, and it shifts viewers' attention to either self or others, and in turn affects the salience of self-image concern, an important intrinsic motive of prosocial behavior. Textual narrativity affects the narrative framing and thereby the narrative persuasion power, we call it an extrinsic persuasion lever.

Empirically, we compile a unique large-scale dataset with 59k MCF campaigns (more than $333 million donations with over 3.3 million donors and 19 million shares) from the GoFundMe platform in the U.S. during 2017-2019. Leveraging computer vision image processing and automatic text mining techniques, we extract embedded interpretable gaze cues from images and narration information from texts. To clearly establish the effects of direct gaze and narrativity, we control for two important factors - medical issues and the nature of fundraisers - that might confound the crowdfunding outcomes.

We find that both direct gaze in the image and narrativity in the text significantly increase medical crowdfunding contributions in terms of total funds raised and total number of donors. We also find evidence of a substitution effect between visual direct gaze and textual narrativity. The degree of substitution varies along different dimensions of narrativity. This suggests practical implications to design a good medical crowdfunding campaign. We demonstrate the robustness of each of these results to a variety of model specifications, dependent variables, controls, and data splits. Our findings directly speak to plausible ways to design campaigns in a medical crowdfunding context.

Our work makes a fundamental contribution to the literature studying online crowdfunding by demonstrating the impact of theory-driven subtle design features on prosocial contributions, in a way creating "synergies between big data and theory" (Rai 2016). Specifically, synthesizing OSA theory and transportation theory, we explore the direct and

interactive effects of visual and textual cues and find that presenting social gaze cues in the image and adopting high narrativity in the texts (i.e., the use of temporality, spatiality, and cognitive tension embedding words in the story) can improve the MCF outcomes by affecting viewers' cognitive process. We also add to the literature on prosocial behaviors by demonstrating the importance of self-image concerns. While the importance of image concerns in motivating prosocial behaviors has been argued (Ariely et al., 2009; Bénabou & Tirole, 2006), limited empirical work has explored factors that induce such image concerns. By exploring if and how visual cues can trigger image concerns through objective self-awareness, we extend the discourse in this literature and contribute to our understanding on how to design crowdfunding campaigns to invoke to mechanisms that can induce self-awareness and thereby affect campaign outcomes.

RELATED LITERATURE

Online Crowdfunding

Online crowdfunding has been increasingly used to solicit funds from crowds to empower new ventures and recover people through adverse experience. The crowdfunding phenomena recently has attracted scholars' interests in the IS and Entrepreneurship communities. Scholars classify crowdfunding models into four types including donation-based (e.g., GoFundMe), reward-based (e.g., Kickstarter), loan-based (e.g., LendingClub) and equity-based (e.g., FundersClub) (Belleflamme et al., 2014). Compensations are provided for crowdfunders based on the market mechanism design for the latter three types while no compensation is provided for donation-based crowdfunding. The primary incentives for contribution to donation-based crowdfunding derive from altruism or social motives (Burtch et al., 2013), but they encounter frictions such as geography or culture difference in the extended interactions (Burtch et al., 2014; Lin & Viswanathan, 2016).

From campaign dynamics perspective, leveraging social networks (Mollick, 2014), social influence (Belleflamme et al., 2014; Burtch et al., 2013; D. Liu et al., 2015), or optimal referring timing (Burtch et al., 2019) to drive traffic and hence to facilitate crowdfunding success have been explored. However, certain groups encounter barriers to affect fundraising dynamics. From a campaign design perspective, extant work focuses on single-modal features mainly from textual information. For example, semantic topics (Yuan et al., 2016) can predict crowdfunding success. Positive psychological capital language (Anglin et al., 2018) and selective linguistic styles (Parhankangas & Renko, 2017) facilitate social crowdfunding more than commercial crowdfunding. Recently, scholars have also begun to look into the role of visual features in equity crowdfunding, such as logo complexity as a low validity visual cue to signal venture innovativeness (Mahmood et al., 2019). However, design features that account for the combination and interactions of visual social cues and textual cues remain understudied. Our work focuses on donation-based crowdfunding and extend the literature by showing that designing subtle social gaze cues and narrativity cues in the crowdfunding message may foster medical crowdfunding contributions.

Self-image Concern, Narrative Persuasion, and Prosocial Contribution

Economics, marketing, and psychology literature shed light on why people help. Image concern, which includes the desire to be liked and respected by others and self, is one primary motive of prosocial behavior (Ariely et al., 2009). When we make a choice, we reveal something of our inner traits not only to others, but also to ourselves, a process called self-signaling. Through such self-signaling, we gain diagnostic utility, beyond the consumption utility, from interpreting the choice (Bodner & Prelec, 2003). The role of self-image concern gains field evidence on charitable giving in a consumption setting. Self-image as opposed to social image is an important driver for consumer response to the donations in two field experiments involving

purchases of consumer goods bundled with a charitable donation (Dubé et al., 2017). Meanwhile, they find that such self-image motive could be crowded out when bundled with extrinsic incentives, i.e., price promotions with donation. Another field experiment in the context of opera booking platform with fundraising activities, consumers can proceed to purchase either with or without admitting themselves as non-donors. When forced to explicitly admitting as non-donors, consumers' self-image concern increases, thereby leading to higher amount of donation (Adena & Huck, 2020). Different from charity giving using a consumption setting, MCF context is a pure charity giving setting. It is likely that design features such as visual social cues can affect donations through self-image concern without a consumption decision and extrinsic monetary incentives such as price discount.

Narratives have power to influence people's attitude and belief on a cultural scale, and these influences also begin with individual recipients. Narratives help people make sense of human experience. To the extent that individuals are transported into a narrative world leaving the real world behind, transportation was proposed as a mechanism by which narrative communications might have persuasive effects (Green & Brock, 2002). Transportation into a narrative world as a distinct mental process is an experiential response, entailing imagery, affect and attentional focus (Green & Brock, 2000), which leads the viewer to lose in the story rather than make counterarguments. Scholars has demonstrated the effectiveness of using narrative messages in communicating health information, for example, Niederdeppe et al. (2014) explore the potential of narrative message to convey attributions about obesity. Kim et al. (2012) document narrative messages have positive impact on smoking cessation intensions. In consumer research, narrative transportation has been established as a mechanism to improve brand evaluation (Escalas, 2004b, 2004a). Given the importance and power of narrative messages, it is

still unclear why some narratives are more impactful than others. Recently, scholars start to explicitly quantify the characteristics of narratives in a continuum scale including shapes, structure and degree of narrativity (Boyd et al., 2020; Toubia et al., 2021; Van Laer et al., 2019). Narrative persuasion and self-image concern operate through very different mechanisms but serve similar ends to promote prosocial contributions. It is therefore important to analyze both in an integrated framework and understand their nuanced interaction effects.

RESEARCH FRAMEWORK

We aim to uncover the role of subtle design features including visual cue and textual cues embedded in the unstructured data, and thereby suggesting easily deployable design features with significant effects on outcomes in the MCF context. We develop a research model illustrated in Figure 1 by synthesizing OSA theory and Transportation theory from social psychology into an information processing framework to build the links among visual cues, textual cues, and MCF outcomes.

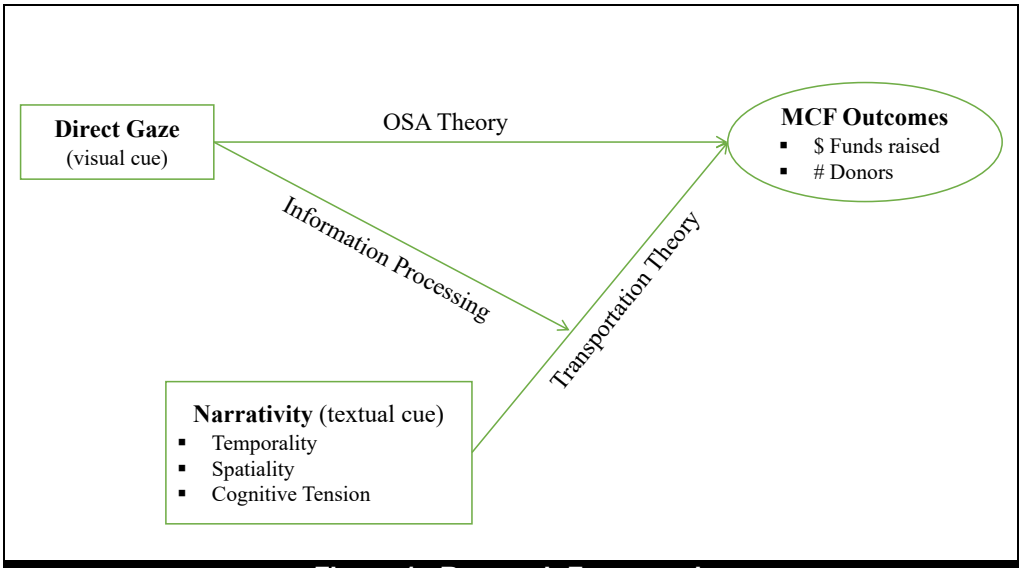

Figure 1. Research Framework

For visual cues conveyed in the image, we focus on one prominent cue about gaze direction in the eyes (i.e., direct gaze). People naturally prioritize faces, especially the eyes (Birmingham et al., 2008; Böckler et al., 2014), and gaze direction cue is more likely to be processed prior to other low-level cues such as light, color, edge or corner stimuli in the environment. More importantly, eye gaze cue has substantial impact on people's behavior, for example, leader's direct gaze can significantly increase receivers' participations (Shim et al., 2021). However, studies of social gaze in the IS field are very scarce. We examine the role of direct gaze in improving MCF outcomes, drawing on OSA theory (Duval & Wicklund, 1972).

For textual cues, we build a three-dimensional narrativity construct to reflect the different dimensions of narrative framing. People often use narrations to tell stories for commercial persuasion, public goods, social causes, and personal causes in the emerging digital platforms. However, studies of story narrations in the IS field are rare. Narrative framing is considered to have effective persuasion effects according to transportation theory (Green & Brock, 2000, 2002), which allows us to hypothesize the relationship between narrativity and MCF outcomes.

We focus on the above two malleable design features, i.e., direct gaze cue in the image and narrativity cues in the text. The combination of visual and textual modals in presenting contents is prevalent on the digital era. While the main effects of these two features are interesting, it's unclear but important to understand how these two design features across different modalities interact with each other. It's worth noting that we study the context where visual cues in the image usually precede textual cues.

Direct Gaze and OSA Theory

Gaze plays a fundamental role in social cognition (Itier & Batty, 2009). Inspired by neuroscience evidence that the eye gaze perception seemed to recruit the spatial cognition system to encode the direction of another's gaze and to focus attention in that direction (Driver IV et al.,

1999, Hoffman & Haxby, 2000), we assume exposure to direct gaze cue reflexively shift individuals' attention from the environment to the self, heightening the self-focused attention. This is consistent with the OSA theory (Duval & Wicklund, 1972), which assume individuals' attention dichotomously to either self or the environment at any given instant and considers self as a socially evaluable object, accordingly the reminder of self-object status increases the self-focused attention. Such self-focused attention automatically increases one's levels of self-evaluation, and it often results in a negative affect because the objectively self-aware person may find his/her shortcomings or the discrepancies between self-attainment and aspiration negative in general across virtually all people and all traits. The attention on the discrepancy leading to negative affect is the core behind the OSA theory (Wicklund, 1975). In other words, the negative affect just varies with the size of the discrepancy, regardless of whether individuals often engage with charity or not. In response to this negative affect and induced objective self-awareness, people may engage in prosocial behavior, for example extending help to the people in need in our context, to self-signal or gain utilities by preserving the self-image (Bodner & Prelec, 2003). In essence, OSA theory, as a motivation theory, provides us a background to understand how the direct gaze cue influences people's helping behaviors.

Transportation Theory and Narrativity

There are many textual cues embedded in story narration, we are interested in their persuasive effects to influence people's attitudes, intents, and decisions. Transportation-imagery model or Transportation theory (Green & Brock, 2000, 2002) explains the persuasive effect of stories/narratives on people and has been extensively tested in media contexts.

According to transportation theory, when people are reading, they may lose themselves in (i.e., are transported to) a narrative world and their attitudes and intentions change to reflect that narrative. Transportation, the feeling of "lost" in the story, is a "distinct mental process and an

integrative melding of attention, imagery and feelings" (Green & Brock, 2000). Three possible mechanisms explain the efficacy of narratives mediated by transportation. First, viewers focus all their mental capacity on the events happening in the narrative, and the full use of mental capacity implies a low level or absence of inner counterarguments. Second, transported readers feel the events described in the narrative are closer to personal experience; Third, transportation evokes strong feelings such that the transported readers or viewers may identify with or develop strong emotions for the characters. The latter two mechanisms imply empathy. In sum, less counter-arguing (limited mental capacity), more empathy (close to personal experience or evocation of strong feelings), and/or the combination make the narratives persuasive.

Narrativity is the most fundamental concept in narratology. However, researchers have not achieved a shared understanding of narrativity (Pier & Landa, 2008). Along with Prince's view that "there is a possible narrative behind everything…everything is not equally narrative…some of them more narrative than others" (Prince, 2004), we think that many if not most texts, such as novels, ads, or MCF message, contain a certain degree of narrativity. Drawing on recurring themes and key concepts in narratology (Boyd et al., 2020; Herman et al., 2012; Prince, 2008; White, 1980; Zoran, 1984), we propose narrativity as the extent of narrative framing and it relates to a collection of three textual attributes: Temporality, Spatiality, and Cognitive Conflict. We measure narrativity by identifying linguistic marketers of these three dimensions.

Temporality means chronology and causality and Spatiality reflects space and perceptual contexts. We consider Temporality and Spatiality as the first two key dimensions of narrativity because time and space are two complementary aspects that together cover all the dimensions of empirical existence, time dimension entailing becoming while space dimension entailing being

(Zoran, 1984). Further, cognitive narratology believe that readers activate when they interpret texts that provide spatial-temporal dimension prompts for doing so (Herman et al., 2012). In the management field, Thompson (1997) depicts consumption stories as spatial-temporal trajectories. This temporal ordering creates relationships between a consumer's contemporary understanding, personal history, and a broader field of historically established meanings. These consumption stories also organize the multiple contexts of experiences (i.e., "places") into a coherent narrative. The temporal sequence of events that happen to the characters in a described setting, termed as "Imaginable plot", is one key narrative element and vital to narrative transportation through mental imagery (Van Laer et al., 2014). Accordingly, we assume that campaign narratives with more details on temporality and spatiality are more likely transport the readers into the narrative world.

As the third dimension of narrativity, cognitive tension is defined as the main character's central frustration. The study of narrative progression or textual dynamics is to understand how narrative creates its effects (Herman et al., 2012). The focal point of a story is the central conflict or cognitive tension – "the main characters face central obstacles or frustrations to their goals or challenges to their worldviews. It is during these challenges that cognitive tension forms in a narrative". Cognitive tension, as the climax of a story, arises as the textual dynamics evolve or with the progressions of the beginning, middle and ending (Boyd et al., 2020). People are more likely to be transported to the narrative world or more likely to be emotionally affected by the story when cognitive tension is high.

In sum, we conceptualize narrativity as a multidimensional construct capturing three dimensions: temporality (reflecting chronology and causality), spatiality (reflecting space and perceptual contexts), and cognitive tension (reflecting main character's central frustration). All

texts exist along a continuum of greater or lesser narrativity across three dimensions. High narrativity in any dimension facilitates the imagery invocation, strong feeling, or empathy development, thereby improving the persuasion of the texts through transportation effect.

Interplay of Direct Gaze and Narrativity

Notably, we study the context where visual cues in the image precede textual cues. The image, in which the visual cue is embedded, is usually the cover of a MCF campaign posting message and sits on the top of story description even after people click into more details about the story. Based on information processing theory, behavior is a consequence of what people think about and how they think about the information (Bettman, 1970; Tybout et al., 1981). In the MCF context, we consider visual cues as prior information and textual cues as newer inputs, both having impacts on the helping behaviors (i.e., the act of donation and the amount of contribution to a crowdfunding campaign) as outputs. It is also likely that prior information may interact with newer inputs. Thus, we propose an interaction effect between visual cues and textual cues in affecting the helping behaviors or MCF contributions.

HYPOTHESIS DEVELOPMENT

Drawing on the above systematic research framework, we next formulate a series of hypotheses pertaining to the impacts of visual cues (direct gaze) and textual cues (narrativity), and plausible interactions that influence the success of MCF.

We begin with direct gaze, a type of visual cue, in the image. We argue that the presence of direct gaze draws the viewer's attention and shifts attention inward to the self, thereby enhancing self-awareness (Baltazar et al., 2014; Conty et al., 2016). The objective self-awareness automatically initiates the self-evaluative process by comparing themselves against ideals or relevant standards. Such comparison typically leads to negative discrepancy between self and standards and thus creates negative affect (Duval & Wicklund, 1972; Wicklund, 1975). This

negative affect has a motivational character, which may enact helping behavior of the viewers to reduce the negative affect. Accordingly, we hypothesize that direct gaze has a positive effect on MCF outcomes.

H1(Direct Gaze Effect): Ceteris paribus, the presence of direct gaze cue will lead to higher MCF outcomes.

Next, according to transportation theory, an individual transported by a high narrativity text is cognitively and emotionally involved in the story and is more likely to experience vivid mental images (Van Laer et al., 2019). The mental images or imagery consume readers' mental capacity and make the reader identify with the character/event in the text or experience stronger feelings (Green & Brock, 2000, 2002). Accordingly, this individual is less likely to counterargue with story assertions by the fundraiser because of intense processing of the text, and thus more likely to comply with the call-to-action of the fundraiser and donate in the crowdfunding campaigns. Taken together, transportation effects work through reducing counterarguing, creating connections (identification and liking) with characters, and increasing emotional involvement. It is therefore reasonable to assume that narrativity may influence the people's helping behaviors. We hypothesize that high narrativity (in terms of temporality, spatiality, and cognitive tension) in crowdfunding message or textual description can improve MCF campaign outcomes.

H2(Narrativity Effect): Ceteris paribus, high textual narrativity cue will lead to higher MCF outcomes.

Finally, we argue that potential donors obtain priors from gaze direction and consider story narration as new information. For one thing, readers with high self-awareness are less likely to become lost in a narrative world, because self-evaluation will increase the viewer's cognitive load, and thus distract attention away from new information elaboration. Specifically,

self-evaluation is aligned with self-referencing by eliciting autobiographical memories, defined as the recollection of earlier events from one's life. This retrieval of autobiographical memories reduces the processing of non-self-related information. In a nutshell, with an increase in self-focus, attention to the new information diminishes. Therefore, there may be interference with the encoding of new information (Sujan et al., 1993). For another, objective self-awareness and transportation state are two opposite mental states where the former involves the reader's attention focused on the self and the latter entails the reader depart their mental resources away from the self and get transported to an outer world. In other words, a loss of self-awareness may accompany a transportation experience (Duval & Wicklund, 1972; Green & Brock, 2002). Readers who are transported into a narrative world have a psychological distance to the real world and are more likely to crowd out or leave behind the self-image concern. Due to this crowding-out effect, cues inducing self-image concern and cues promoting narrative persuasion are likely to act as substitute instruments from the campaign design perspective.

Therefore, we postulate a crowding-out effect that the presence of direct gaze cue moderates the new information elaboration process; specifically, the presence of direct gaze cue attenuates the differential impacts of high (versus low) narrativity on persuasion.

> ***H3(Crowding-out Effect): The presence of direct gaze cue will negatively affect the impact of narrativity cue on medical crowdfunding outcomes, i.e., the negative moderating effect, or, the crowding-out effect.***

METHODS

Unexpected medical bills frequently cause financial hardship despite insurance status and prominently impact individuals who face difficulty in paying (Hamel et al., 2016). MCF, a pure donation-based crowdfunding without external incentives, is increasingly used to finance personal healthcare-related expenses. Online crowdfunding platforms often encourage

fundraisers to utilize compelling stories and high-quality images to influence potential donors. A typical MCF campaign starts with an introductory image. This image appears at the top of the fundraising campaign, and it is also the cover image that will appear when it is shared on social media, such as Facebook, Twitter, etc. Then the individuals who are exposed to the campaign image can further click on the image to read the whole stories. Figure 2 is an example campaign from the GoFundMe platform.

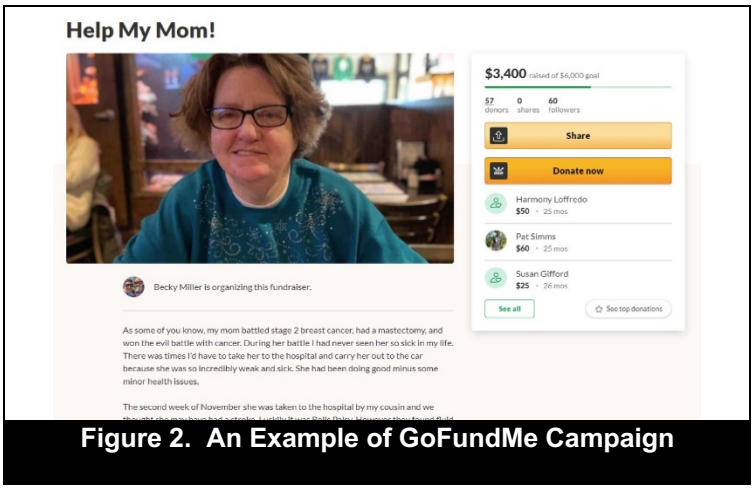

Figure 2. An Example of GoFundMe Campaign

To approach unstructured data and derive insights from them, we leverage multiple techniques and methodologies to compile, extract, estimate and transform the data. First, we adopt web scraping to curate the public available MCF data. Next, for visual data we leverage computer visions to process images, estimate gaze/ head direction, and transform gaze direction via a geometry method. For textual data, we use named entity recognition and ICD 11 coding tools to extract and categorize medical conditions, automatic text analysis to operationalize narrativity. Lastly, we apply econometric models to estimate the effect sizes of subtle design features and their interactions.

Data and Variables

We compile a unique dataset of MCF campaigns from the GoFundMe platform. In October 2020, we scraped 81k MCF campaigns created since 2012. The volume of earlier campaigns is relatively less than later campaigns, and there might be a selection issue for staying on the platform for a long time. Thus, we choose our sampling period from 2017 to 2019 and removed campaigns outside the U.S., in non-English, pet/animal-related, or with no funds raised. The final sample consists of 59,394 campaigns and the campaign distribution is depicted in the U.S. map in Figure 3. Our sample covers campaigns with creators geographically located in 15k zip codes. The campaigns involve $334 million donations, 3.3 million donors, and 19 million shares. The data includes information on campaign outcomes (funding goals, raised funds, and number of shares on social media), introductory images, story narrations, creator locations, creation time, and with team organizer or not, etc. We also append the county-level demographic data by linking the zip code to the county FIPS code.

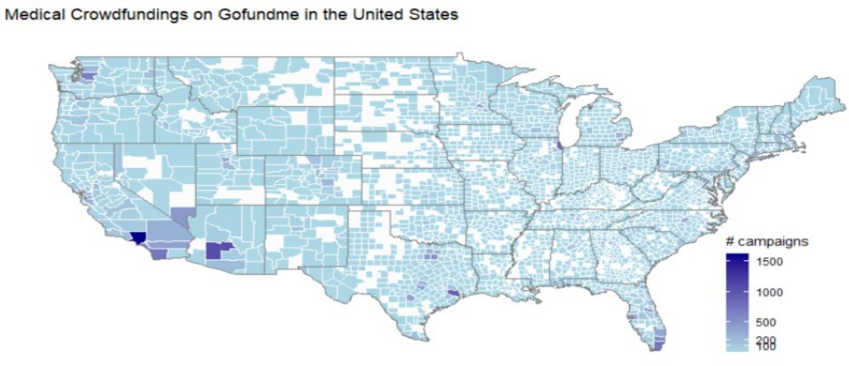

Figure 3. Our Sample of GoFundMe MCF Campaigns

Campaign Outcomes (Dependent Variable)

The GoFundMe platform does not require fundraisers to meet their funding goal to receive the funds they have raised. We measure the success of MCF by two outcome variables: the total funds raised and the number of donors. The total funds raised is skewed to the right, with the median $2,892 much smaller than the mean $5,622. Similarly, the total number of donors is right skewed as well, with the median 33 vs. the mean 55. To get normalized data, we log transformed both outcome variables.

Constructing Direct Gaze (Visual Cue)

Fundraisers choose to display different visual social cues in the introductory image for a specific crowdfunding campaign. Direct gaze is one prominent high-level perception cue or visual social cue, a perceived gaze cue looking directly towards the viewer. Below are three examples of visual social cues in Figure 4. The left two images show a human face compared to the right one. Among the human face cues, the left one shows a direct gaze cue.

Figure 4. Visual Social Gaze Cue Examples

We extract embedded interpretable gaze cues from the campaign introductory image. In an everyday life setting, gaze direction is a joint function of head pose and eyeball movement. Appearance-based methods are believed to perform well in an everyday setting. However, estimating gaze direction in the natural environment is a known challenge due to the lack of

sufficiently large and diverse annotated training data for the task. Existing appearance-based methods are either based on data collected in the lab or use head pose as an approximate for gaze direction in the wild environment. However, small appearance variation is the primary constraint associated with the popular training datasets, for example, UT Multi-view (Sugano et al., 2014) and MPII Gaze (Zhang et al., 2017). Wild environment appearance-based data typically only capture head pose and lacks precise eyeball movement data (Massé et al., 2017).

We apply the computer vision techniques on gaze and head pose estimation based on a unique labeled dataset obtained in the natural environment (Fischer et al., 2018). This package is based on two separate convolutional neural networks for eye gaze estimation and head pose estimation. Eye gaze estimation output is with respect to the face coordinate system and head pose estimation output is with respect to the camera coordinate system. We then transform the output into interpretable direct gaze cues with respect to the image viewer's perspective with a gaze transform layer, which combines head pose and eyeball movement models considering geometry constraints (Deng & Zhu, 2017). Gaze vector g can be represented as g_h and g_c in the head and camera coordinate system, respectively. Specifically, the transformation between g_h and g_c is defined by head pose R: $g_c = Rg_h$, as shown in Figure 5. For the image with multiple faces, we randomly choose at most five faces and define the direct gaze variable for each face. If at least one face has a direct gaze cue, we define this image as having a direct gaze cue.

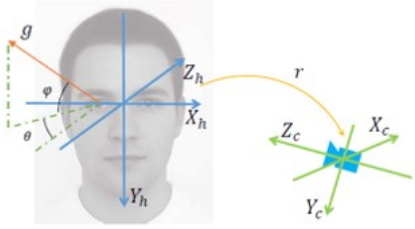

Figure 5. Gaze Vector Transformation (Deng & Zhu, 2017)

We detect human faces in the image first, then we apply the RT-GENE GitHub package within images that have human face detected (Fischer et al., 2018) to estimate gaze vector with respect to the head g_h and head pose R. At last, we transform the gaze vector g_h to g_c, with respect to the camera, i.e., in the image viewer's perspective. The final transformed g_c includes two dimensions along with yaw and pitch angles. We define direct gaze by a cone confining both yaw and pitch angles within 15 degrees. If the gaze vector g_c falls outside the confined 15-degree region, it is defined as averted gaze. Both missing gaze cues (no human face detected) and averted gaze are coded as having no direct gaze cues.

Constructing Narrativity (Textual Cues)

We construct and measure narrativity with three dimensions: temporality, spatiality, and cognitive tension. Narrativities with different texts are comparable along those three dimensions.

We use text mining tools (LIWC 2015) to extract narrativity components or language markers from textual data. Specifically, temporality (i.e., temporal embedding) is defined by time and causation words intensity. Spatiality (i.e., spatial embedding) is defined by space and perceptual process words intensity (Van Laer et al., 2019). Cognitive tension is defined by the maximum cognitive process words intensity among several text segments (Boyd et al., 2020). In our study, we segment the texts into three parts and use the part with the maximum cognitive process words intensity to measure the cognitive tension or the climax of the story.

Plausible Confounding Factors

Medical Conditions: The retrieval of medical issues from text is an intriguing and challenging task. Many scholars are attempting to contribute to this area. We leverage a named-entity recognition technique in IBM's natural language understanding API to identify medical condition terms disclosed in the story narrations. 70% of MCF campaigns in our sample

mentioned medical condition terms and we recognized 7,618 unique medical condition terms (84,322 total medical condition terms) in our sample story narrations.

We developed two ways to categorize those medical issues. First, we harness the up-to-date medical professional knowledge in International Classification of Diseases (ICD), a legally mandated health data standard maintained by WHO. ICD is a globally used diagnostic tool for epidemiology, health management and clinical purposes. We used ICD-11 coding tool, the most recent version of ICD taking effect in January 2022[3], to classify the medical conditions into 22 disease categories. Second, we adopted LDA topic modeling technique on top of the identified health conditions in each story and cluster them into 9 topics as robustness check on model estimations (please see appendix for the detailed health topics).

Nature of Fundraisers: We extract information of the nature of fundraisers in two dimensions: (1) self- or surrogate fundraiser, which is proxied by first vs third pronouns of the fundraiser, and (2) team-based fundraiser or individual fundraiser.

Control Variables

Besides medical conditions and the nature of fundraisers, we control for five other aspects: image content, story feature, campaign level attributes, county level demographics and shares.

(1) Image content: The presence of a human face, number of Faces, presence of female and average ages. We use Face++ API to extract those image content features. We also use image pixel size as the proxy for image quality.

(2) Story features: Emotional valence from words used in the story descriptions. We use the Linguistic Inquiry and Word Count (LIWC) to count the difference between the intensity of

[3] https://www.who.int/standards/classifications/classification-of-diseases
https://icd.who.int/browse11/l-m/en

positive emotion process words and negative emotion process words, and then normalize the measure. Story length. The two measures of length (i.e., sentence count and word count) are significantly and positively correlated with one another ($\rho = 0.91, p < 0.001$). We computed a z-score for both sentence count and word count and summed the individual scores to create one composite measure for story length.

(3) Campaign level attributes: Campaign goal refers to the amount of funds the fundraiser wants, and we use normalized log transformation of this measure. To account for the unobserved heterogeneities across geography and time that are not related to visual and textual cues embedded in the campaign characteristics, we also include random effects of zip code where the campaign is initiated and random effects of campaign creating date in the model.

(4) County level demographics: Median Household Income, High Education Population, and Income below Poverty Population. We normalize the log transformation of those characteristics in the model.

(5) Social Media Shares: We cannot observe the campaign fundraiser's social network, and post-campaign engagement efforts, and other inherent heterogeneous abilities or resources to attract attention, in our data. Hence, we control the number of shares on social media that may manifest those unobserved factors and the possible mediation through sharing dynamics. Also, when we study the interaction between direct gaze and story narration, we include the interaction between direct gaze and shares. The shares variable in the model is normalized log transformation.

We report the statistics of the key variables in Table 1 and report the medical conditions distribution according to ICD11 in Table 2. 70% MCF campaigns disclosed some medical conditions with totally over 84k terms and 7.6k unique terms. We classify them into 22

categories, harnessing the extensive and deep medical professional knowledge in the WHO disease classification system ICD11. We find that the biggest category is Neoplasms such as different kinds of cancers. The second biggest category is Nervous system such as stroke, epilepsy, or seizures. The third category is infection related disease.

Table 1. Variable Statistics Summary

Variables	#Obs.	Mean	Std. Dev.	Min	Median	Max
$raised	59,394	5,622	9,609	45	2,892	676,285
log(raised)	59,394	7.99	1.13	3.81	7.97	13.42
#donors	59,394	55.71	87.77	1.00	33.00	3,900.00
log(donors)	59,394	3.52	0.95	0.00	3.50	8.27
#shares	59,394	330.25	579.36	0.00	176.00	48,900.00
log(shares)	59,394	4.60	2.13	0.00	5.18	10.80
$avg donations	59,394	105.40	302.21	5.00	85.83	58,650.00
$goal	59,394	23,523	713,585	1.00	10,000	100,000,000
log(goal)	59,394	9.02	1.27	0.00	9.21	18.42
Temporality	59,394	0.80	0.40	0.00	1.00	1.00
Spatiality	59,394	0.80	0.40	0.00	1.00	1.00
Cognitive Tension	59,394	0.00	1.00	(1.69)	(0.11)	14.65
#Words	59,394	284.98	249.63	8.00	218.00	5,210.00
#Sentence	59,394	13.87	12.32	1.00	11.00	411.00
Normalized Story length	59,394	0.00	0.98	(1.08)	(0.26)	25.99
Normalized Emotion Valence	59,394	0.00	1.00	(8.16)	(0.08)	9.96
Team	59,394	0.28	0.45	0.00	0.00	1.00
Direct Gaze	59,394	0.13	0.34	0.00	0.00	1.00
Human Face	59,394	0.86	0.35	0.00	1.00	1.00
#faces in image	54,227	1.99	1.93	1.00	1.00	50.00
%females in image	52,451	0.70	0.46	0.00	1.00	1.00
#avg ages in image	52,451	40.50	15.82	2.00	39.00	98.00
Median Household Income	58,877	60,785.51	22,387.35	2,499.00	56,280.00	250,001.00
Normalized log(Median Household Income)	58,877	0.00	1.00	(8.84)	(0.04)	4.17
High Education Population	58,877	238,514	373,605	52	103,667	2,016,234
Normalized log(High Education Population)	58,877	0.00	1.00	(4.35)	0.14	1.90

Income below Poverty Population	58,877	151,809	281,629	23	54,323	1,589,956
Normalized log(Income below Poverty Population)	58,877	0.00	1.00	(4.93)	0.05	2.21

Table 2 Distribution of Medical Crowdfunding Campaigns by Disclosed Medical Conditions according to ICD 11 Categories

Category	Category - Description	%Campaigns
1	Infections	4.6%
2	Neoplasms	29.9%
3	Blood	0.7%
4	Immune system	0.9%
5	Endocrine, nutritional, metabolic	2.7%
6	Mental and behavioral or neurodevelopment disorders	2.5%
7	Sleep-wake disorders	0.3%
8	Nervous system	8.2%
9	Eye and adnexa (visual system)	1.3%
10	Ear and mastoid	0.2%
11	Circulatory system	4.5%
12	Respiratory system	3.2%
13	Digestive system	2.5%
14	Skin	1.3%
15	Musculoskeletal system	1.1%
16	Genitourinary system	2.0%
17	Sexual health	0.0%
18	Pregnancy, childbirth, or the puerperium	0.4%
19	Perinatal and neonatal	0.3%
20	Developmental anomalies	1.2%
21	Symptoms, signs, or clinical findings not elsewhere classified	2.2%
22	Injury, poisoning or certain other consequence of external causes	1.0%
NA	No medical condition terms disclosed in the message	30%

Identification Strategy and Econometric Models

A large scale of real-life campaigns, initiated by different individuals ranging from different geographical locations across a 3-year temporal span, provide us a good number of

exogeneous variations to estimate the effects of the image and textual cues on medical crowdfunding outcomes. However, there are two primary sources of endogeneity of the crowdfunding campaign design features: medical conditions and the nature of fundraisers.

First, medical issue is the main cause for medical crowdfunding, and it varies a lot in terms of urgency, severity, ease of explaining, and familiarity to the public. Therefore, campaigns due to different medical issues tend to have different fundraising outcomes. For instance, campaigns due to injuries or cancers are likely to get more funding than campaigns due to mental or endocrine issues. Meanwhile, different type of medical issues may also affect the choice of campaign design in featuring human photos or not. In other words, the presence of human face and direct gaze cue in the image could be endogenized with the medical issues. For instance, patients suffering from facial injury or visual problems, if they choose to, may be more likely to show their face (together with gaze) in the image to show their syndromes. In contrast, patients in coma or dangerous condition are unlikely to show direct gaze in the image.

Second, fundraisers can be the people in need themselves or surrogate others who act on behalf of the people in need to initiate the crowdfunding campaign. Similarly, the fundraising can be conducted by a team or by an individual fundraiser. Accounting for the nature of fundraisers is important because different types of fundraisers are likely to have their preference of image to feature the crowdfunding campaign. For example, self-fundraisers who seek crowdfunding for themselves may face social stigma to show their needs, or the surrogate fundraisers may have the concerns for the privacy of the needed ones, thereby resulting in the variation in the use of human photos. Similarly, compared to single fundraiser, team fundraisers might need more effort to reach an agreement on whether to show patients' face and eye gaze in

the campaign image, and at the same time, have more social support to raise more funds than the single fundraiser.

In sum, both medical conditions and the nature of fundraisers may be correlated with the crowdfunding outcomes and at the same time with the selection of image and story narration. Therefore, our identification strategy firstly relies on accounting for medical issues and the nature of fundraisers to identify the effect of visual and textual cues.

Beyond confounding factors, we try to explicitly control for many other factors that affect fundraising outcomes, including social contents in the image, the story features, originating region socio-eco factors, campaign level factors. Lastly, we account for the unobserved geo-temporal heterogeneities and dependency among observations into the model by including county random effect and time (Year-Month) fixed effect.

Specifically, we begin with the base regression model with direct gaze and narrativity cues along with control variables and number of shares. Model 2 takes care of the confounding factors by including medical issues and the nature of fundraisers. Model 3 represents the full model by further accounting for unobserved heterogeneities through the county random effects and time fixed effects. Notably, we explore the plausible interaction between direct gaze and story narrations in Model 4-6 to understand the potential substitute effects between visual cues and textual cues. As previous scholars indicate that certain groups are likely to face more difficulties in crafting persuasive communications using digital media and in converting social participants into their potential donors (Burtch & Chan, 2019).

$$Model\ 1\text{: } \log(y_{ijd}) = \alpha + \beta directgaze_{ij} + \gamma_1 temporality_{ij} + \gamma_2 spatiality_{ij} + \gamma_3 cogtension_{ij} + \phi_1\, control_{ij} + \phi_2\, shares_{ij} + \epsilon_{ijd}$$

$$Model\ 2\text{: } Model\ 1 + \phi_3 medical\ issues + \phi_4 firstpron + \phi_5 team$$

$Model\ 3: Model\ 2\ +\ a_j\ +\ t_d$

$Model\ 4: Model\ 3\ +\lambda_1\ directgaze_{ij} \times\ temporality_{ij}$

$Model\ 5: Model\ 3\ +\lambda_2\ directgaze_{ij} \times spatiality_{ij}$

$Model\ 6: Model\ 3 + \lambda_3\ directgaze_{ij} \times\ cogtension_{ij}$

In the above models, $a_j \sim N(0, \tau_{00}^2), t_d \sim N(0, w_{00}^2), \epsilon_{ijd} \sim N(0, \delta^2), log(y_{ijd})$ represents the dependent variable either $ raised funds or #donors; i represents campaign level, j represents campaign located county, and d represents campaign creating date.

Results and Robustness Check

The model results are summarized in Table 3 where $log(\$raised)$ is the dependent variable. First, we find that direct gaze positively affects MCF contributions with respect to $raised funds. Specifically, model 3 shows that the presence of direct gaze significantly increase raised funds by 2.36%. We do a back of the envelope calculation for 2% increase of raised funds based on the average campaign performance, i.e., $2\% * \$5{,}622 = \$112$. We consider this as economic significance for using a simple and subtle visual social gaze cue in the picture. The results support the direct gaze effect (hypotheses H1).

For narrativity, both spatiality dimension and cognitive tension dimension positively affect $raised funds, but temporality dimension doesn't. Therefore, the results support our narrativity effect (hypotheses H2) with some nuances.

Lastly, there is a significant interaction effect between direct gaze and temporality dimension on MCF outcomes. The interactions of direct gaze and other two dimensions – spatiality and cognitive tension are also negative though not significant. Therefore, negative interaction or substitution effect in Hypothesis H3 is partially supported with some nuances. Specifically, the presence of direct gaze suppresses the positive effect of narrativity temporality

dimension but not that of spatiality and cognitive tension. It implies that the direct gaze effect can completely crowd out the narrativity effect when the narrativity in temporality dimension is low. In other words, the self-image concerns can wipe out the effect of narrative persuasion levers in the text.

We interpret that the nuanced insignificant interaction effect could be due to the complex nature of social information integration by different kinds of potential donors. We mainly focus on the campaign design perspective to conduct our research, and we acknowledge our data limitation that prevents us to further verify the specific mechanisms from the donors' perspective.

Table 3. Model Results on log($raised)

	(1)	(2)	(3)	(4)	(5)	(6)
Direct Gaze	0.0294 ***	0.0266 **	0.0236 **	0.0648 ***	0.0349	0.0235 **
	(0.0108)	(0.0108)	(0.0099)	(0.0217)	(0.0222)	(0.0099)
Temporality	0.0178 *	0.0257 ***	0.0128	0.0195 **	0.0128	0.0128
	(0.0099)	(0.0099)	(0.0091)	(0.0096)	(0.0091)	(0.0091)
Spatiality	0.0296 ***	0.0259 ***	0.0183 **	0.0183 **	0.0201 **	0.0183 **
	(0.0098)	(0.0098)	(0.0090)	(0.0090)	(0.0095)	(0.0090)
Cognitive Tension	0.0290 ***	0.0256 ***	0.0207 ***	0.0207 ***	0.0207 ***	0.0211 ***
	(0.0035)	(0.0036)	(0.0033)	(0.0033)	(0.0033)	(0.0035)
Direct Gaze * Temporality				-0.0511 **		
				(0.0240)		
Direct Gaze * Spatiality					-0.0139	
					(0.0244)	
Direct Gaze * Cognitive Tension						-0.0036
						(0.0101)
Human Face	0.0422 ***	0.0372 ***	0.0297 ***	0.0295 ***	0.0297 ***	0.0297 ***
	(0.0117)	(0.0117)	(0.0108)	(0.0108)	(0.0108)	(0.0108)
Story Length	0.0609 ***	0.0742 ***	0.0501 ***	0.0502 ***	0.0501 ***	0.0500 ***
	(0.0059)	(0.0062)	(0.0057)	(0.0057)	(0.0057)	(0.0057)
Story Length squared	-0.0042 ***	-0.0045 ***	-0.0031 ***	-0.0031 ***	-0.0031 ***	-0.0031 ***
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Share	0.7639 ***	0.7402 ***	0.6228 ***	0.6227 ***	0.6228 ***	0.6228 ***

	(0.0070)	(0.0070)	(0.0066)	(0.0066)	(0.0066)	(0.0066)
First Pronoun		-0.1202 *** (0.0079)	-0.1286 *** (0.0073)	-0.1287 *** (0.0073)	-0.1286 *** (0.0073)	-0.1286 *** (0.0073)
Team		0.0934 *** (0.0079)	0.1051 *** (0.0074)	0.1051 *** (0.0073)	0.1051 *** (0.0074)	0.1051 *** (0.0074)
Intercept	7.7128 *** (0.0151)	7.7322 *** (0.0163)	8.2142 *** (0.0855)	8.2086 *** (0.0856)	8.2129 *** (0.0856)	8.2141 *** (0.0855)
Medical Issues	N	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y
County RE/Time FE	N	N	Y	Y	Y	Y
Observations	59394	59394	59394	59394	59394	59394
R^2 adjusted	0.424	0.431	0.52	0.52	0.52	0.52
AIC	150151	149506	140066	140063	140067	140068

** p<0.1 ** p<0.05 *** p<0.01,* Standard errors in parentheses.

Regarding varying medical conditions, we find that big categories Neoplasms and Infections do raise more MCF contributions while the chronic nature of diseases like Endocrine, Nutritional, Metabolic (category 5) and Mental and behavior disorders (category 6) secure less MCF contributions. Please find details in appendix Fig 6.

The gaze effect on the MCF outcomes is robust. We perform the following robustness checks: (1) using log (# donors) as the dependent variable; (2) different model specifications including county and time fix effect; (3) estimation on split samples, such as for the campaigns with the presence of human face, or for campaigns with at least 1 share. The detailed the robustness check results are included in the appendix A-E.

DISCUSSION

Theoretical Contributions

We synthesize the OSA theory and transportation theory into an information processing framework to study the roles of theory-driven subtle design features across visual (i.e., direct gaze) and textual (i.e., narrations) modalities in promoting prosocial contributions to MCF campaigns. Using a unique big dataset, we find that using direct gaze in the campaign image can

improve the campaign outcomes; at the same time, crafting a campaign message with high narrativity such as incorporating detailed temporality, spatiality, and cognitive tension information can also boost campaign success; in the meanwhile, the use of direct gaze may partially crowd out the narrativity effect especially in the temporality dimension.

Theoretically, our study first contributes to the crowdfunding literature by investigating the role of campaign design factors within the control of individuals in crowdfunding success and our findings show the importance of managing campaign designs. IS scholars have identified many frictions in crowdfunding campaigns such as geography, culture, and social capital in the extended interactions (Burtch et al. 2013, 2014; Lin and Viswanathan 2016; Mollick 2014). However, these frictions are hard or slow to change, require societal or institutional effort, and are often beyond the control of individuals who urgently need help using crowdfunding. Our study finds that utilizing subtle campaign design features such as visual and textual cues can entail quick positive impacts on campaign outcomes without the extensive effort on overcoming geographic, cultural, and social capital frictions.

Second, we add to the literature in the economics of unstructured data by offering a new theoretical understanding the role of multi-modal cue interactions in promoting helping behaviors on the online crowdfunding platforms. A recent study on the interaction of two modalities suggests verbal superiority and the congruency effect between verbal and the visual modalities (Zhao et al., 2022). They focus on different modal presentations conveying similar information such as emotion expressions. Different from their study, we focus on the combination of various cues exhibited in different modalities such as image and text, regardless of the information involved. We use a theory driven approach to uncover the important roles of visual and textual cues embedded in unstructured data, i.e., gaze direction (a high-level social

visual cue) from the image and narrativity framing cue (low-level narrative cues) from texts. Interestingly, the direct gaze effect (visual cue) from the image crowds out the narrativity effect (narrative cue) in temporality dimension but not in the spatiality and cognitive tension dimensions from the text. In general, our study advances the conversation in the economics of unstructured data literature (Li & Xie, 2020; L. Liu et al., 2020; S. Zhang et al., 2018) by shedding light on the significance of combining image cues and text cues, a prevalent format of presentation on online platforms.

Third, we join in the conversation regarding antecedents of prosocial behavior. Our study on direct gaze highlights the importance of instrumenting objective self-awareness (OSA) or self-image concern of potential donors in promoting helping behavior, while the analysis on narrativity implies the importance of crafting high-quality narrative persuasion. Our finding on the negative interaction effect between direct gaze and narrativity echoes the field findings regarding public goods or prosocial behavior where the extrinsic incentives crowd out intrinsic and image related motives (Adena & Huck, 2020; Dubé et al., 2017; J. G. Kim et al., 2018). The key difference is that our study concerns a pure prosocial setting without involving any commercial product or service consumption and indicate that self-image concern may also crowd out extrinsic persuasion tactics. Moreover, we extend the conversation on effects of direct gaze as a visual cue to the case of multi-modality, i.e., direct gaze as a visual cue and combined with textual narrations. Meanwhile, we also shift the context to prosocial context from commercial advertising context (Adil et al., 2018; To & Patrick, 2021). The most recent literature on gaze direction close to our argument is conducted in the advertising effectiveness context (To & Patrick, 2021), where they demonstrate that averted gaze (vs. direct gaze) as a visual cue enhances advertising effectiveness, mediated by narrative transportation of the advertisement in

the image. In other word, they focus on the persuasive potential of averted gaze as a visual element in the advertising. We are different from them in three aspects. First, we focus on the attention shift effect of direct gaze visual cue vs. the averted gaze (Adil et al., 2018). Second, while they demonstrate narrative transportation as mediation of averted gaze visual cue, we examine the narrativity persuasion effect in the textual cues and the moderation effect of direct gaze visual cues. Third, rather than focusing on the advertising context, we examine the prosocial crowdfunding context where the persuasion outcome is prosocial behaviors rather than attitudes. In a prosocial crowdfunding context, direct gaze also serves as a social cue rather than being a visual cue only in the advertising context.

Managerial Implications

We provide the first empirical evidence of the role of subtle design features in both the images and texts in online medical crowdfunding. The presence of direct gaze cue and narrativity framing are under the primary control of fundraisers, regardless of their demographic characteristics, social network, and the ability to engage with the campaign dynamics. Our findings directly speak to ways to design better MCF campaigns concerning elements entailing little efforts and low barriers. Furthermore, the finding on negative interaction between different cues has important implications on mitigating the disparity in the ability of crafting high-quality textual narrations and in access to healthcare resource via crowdfunding.

For individual crowd fundraisers who aim to improve the users' efficacy, our study provides some practical campaign design guidance. Specifically, choosing an image with direct gaze cue can increase the raised funds because of the induced self-image concern. In the textual narration design, it is beneficial to present the campaign causes with a high narrative framing. High narrativity, especially in spatiality and cognitive tension dimensions, helps transport viewers into the real frustrations of characters in need through triggering viewers' imaginary to

occupy their mental capacity or through fostering strong emotional experience such as empathy, thereby triggering helping behavior. When using the combination of image and text cues, it is important to be aware of the plausible crowding-out effect between direct gaze and narrativity. In the meanwhile, this crowding-out effect can also be interpreted as a substitute effect between direct gaze and narrativity. If fundraisers have difficulty crafting high quality narrations or captive stories, they can rely more on image with direct gaze to improve fundraising success as direct gaze and narrativity can substitute each other to some extent. In other words, image may mitigate the detrimental effects of low narrativity (such as temporality of plot progression in the texts).

For crowdfunding platforms, it is useful for them to provide some guidance to fundraisers on how to craft better quality campaign post by considering adding photos with direct gaze. Adding notes on image uploading page or using pop-up window to remind consumers about the merit of adding image with direct gaze will be helpful. Providing specific tips on how to improve temporality, spatiality, and cognitive tension would also be useful for the platforms to improve its existing campaign outcomes, which may improve the impact and the future utilization of the platforms.

For policy makers, it's worth noting that there is a wealth of information on medical issues disclosed by a vast number of individuals in need of financial support in the MCF narrations. This information uncovered from the crowdsourcing data has implication for relevant policy makers to monitor the effects of relevant public health policy or identify/detect health care gaps or disparity in the society.

Limitations and Future Research Directions

We acknowledge limitations of our work. First, we do find the positive impacts of direct gaze and narrativity on crowdfunding outcomes, but our aggregate level data doesn't allow us to

rule out other mechanisms behind these effects. Building on previous literature, we argue that these two design features and their interactions take effects because of the raised levels of self-awareness and transportation into the narrative story. However, it is possible for other mechanisms to work at the same time. Future studies may utilize neuroscience tools to figure out all potential mechanisms behind these effects. Second, due to the archival nature of our data, we do not observe fundraisers' social network and engagement dynamics during the campaign process. It is possible that fundraisers with larger social network are more literate, thus more likely to craft high quality campaign posts (e.g., with high narrativity), get more fund raised, and create more social network engagement. Despite that, we assume the use of image with direct gaze is in general unrelated to the size of social network and we do find that using image with direct gaze has positive impact on the number of shares on social media. Future studies can utilize field experiments to further examine the nuanced relationships among social network characteristics, crowdfunding campaign designs, and campaign outcomes. Third, we found negative interaction between crowdfunding outcomes and narrativity in the temporality dimension, but not in spatiality and cognitive tension dimensions. The reasons behind these nuanced findings need further examination in future studies.

Our theory-driven approach calls for research on understanding individual behaviors from unstructured data by the marriage of big data techniques and theories in various disciplines such as psychology, cognitive process, and communication etc. Beyond gaze direction and narrativity, it is also interesting for future studies to examine how to improve the efficiency of crowdfunding campaigns using other aspects of the campaign features, such as, story tone structure (from happy to sad tone or vice versa), emotions detected from image, and their potential interactions. Meanwhile, many low-level cues such as background settings presenting

the healthcare equipment or not in the image might also impact viewer's cognitive process, affect downstream behaviors according, and even interact with high-level visual cues. At last, our study suggests visual cues like gaze direction facilitate shifting people's attention focus either to the self or outer and the shifted attention focus impact the subsequent mental processing. Future study can investigate the role of shifting attention focus in soliciting responses for adverse stories.

CONCLUDING REMARKS

MCF is a prevalent channel to support individual's financial needs for medical causes, however, the success rate is low. Certain groups manifest low use efficacy of such emerging platform because of variations in their ability to effectively present their message. To encourage helping behavior and improve campaign outcomes, we examine two subtle campaign design features including direct gaze cue in the image and narrativity cues in the texts. These features are under the control of individual fundraisers, entails less efforts, and go beyond the frictions that IS scholars have identified in the extended interactions.

We develop a research model by synthesizing OSA theory and transportation theory in an information processing framework. The empirical results based on a unique big dataset are consistent with our research model prediction regarding the significance of these two theory-driven design features. We find that both the presence of direct gaze (i.e., inducing self-image concern) and high degree of narrativity (i.e., the use of narrative persuasion) increase MCF outcomes. Furthermore, the presence of direct gaze attenuates the differential benefits of narrativity, specifically, in term of temporality, while not significant in terms of spatiality and cognitive tension. The potential negative synergies (crowding-out effects) enrich and extend the theoretical understanding of the combination of visual cues and textual cues and the antecedents

of prosocial behaviors. To advance the conversation, future studies can pursue the role of shifting attention focus and a deeper understanding of the nuanced roles of narratives.

Our findings have practical implications for individual fundraisers to design better campaign posts, for crowdfunding platforms to offer better guidance to fundraisers, and for policy makers to uncover the healthcare gaps from the crowds.

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APPENDIX

Appendix A: Estimates on Medical Conditions in Model 3

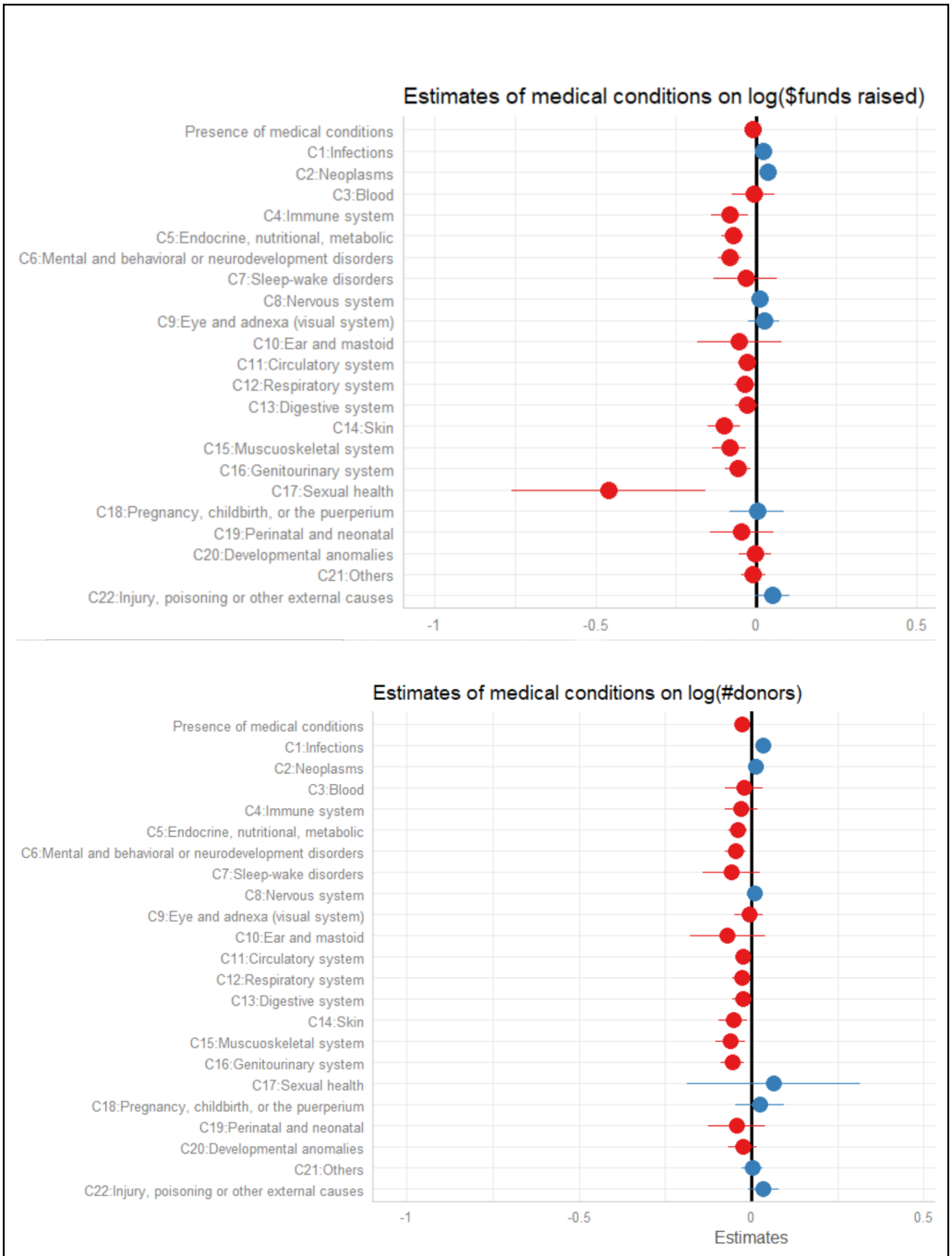

Figure 6. Model Estimates by Medical Conditions

Appendix B: Model Results Using log (# donors) as the Dependent Variable

Table 4. Model Results on log(#donors)						
	(1)	(2)	(3)	(4)	(5)	(6)
Direct Gaze	0.0211 ** (0.0088)	0.0193 ** (0.0087)	0.0167 ** (0.0082)	0.0447 ** (0.0181)	0.0415 ** (0.0185)	0.0167 ** (0.0082)
Temporality	0.0212 *** (0.0080)	0.0263 *** (0.0080)	0.0148 * (0.0076)	0.0193 ** (0.0080)	0.0148 ** (0.0076)	0.0148 * (0.0076)
Spatiality	0.0404 *** (0.0080)	0.0379 *** (0.0080)	0.0324 *** (0.0075)	0.0324 *** (0.0075)	0.0362 *** (0.0079)	0.0324 *** (0.0075)
Cognitive Tension	0.0191 *** (0.0029)	0.0189 *** (0.0029)	0.0159 *** (0.0027)	0.0159 *** (0.0027)	0.0159 *** (0.0027)	0.0162 *** (0.0029)
Human Face	0.0643 *** (0.0095)	0.0606 *** (0.0095)	0.0574 *** (0.0089)	0.0573 *** (0.0089)	0.0573 *** (0.0089)	0.0574 *** (0.0089)
Story Length	0.0244 *** (0.0048)	0.0352 *** (0.0050)	0.0207 *** (0.0047)	0.0208 *** (0.0047)	0.0207 *** (0.0047)	0.0207 *** (0.0047)
Story Length squared	-0.0023 *** (0.0007)	-0.0026 *** (0.0007)	-0.0018 *** (0.0006)	-0.0018 *** (0.0006)	-0.0018 *** (0.0006)	-0.0018 *** (0.0006)
Share	0.9058 *** (0.0057)	0.8916 *** (0.0057)	0.8251 *** (0.0055)	0.8251 *** (0.0055)	0.8251 *** (0.0055)	0.8251 *** (0.0055)
Team		0.0689 *** (0.0064)	0.0698 *** (0.0061)	0.0698 *** (0.0061)	0.0698 *** (0.0061)	0.0698 *** (0.0061)
First Pronoun		-0.0840 *** (0.0064)	-0.0901 *** (0.0060)	-0.0902 *** (0.0060)	-0.0902 *** (0.0060)	-0.0901 *** (0.0060)
Direct Gaze * Temporality				-0.0347 * (0.0199)		
Direct Gaze * Spatiality					-0.0304 (0.0203)	
Direct Gaze * Cognitive Tension						-0.0031 (0.0084)
Intercept	3.2945 *** (0.0123)	3.3224 *** (0.0132)	3.5620 *** (0.0711)	3.5582 *** (0.0712)	3.5592 *** (0.0712)	3.5619 *** (0.0711)
Medical Issues	N	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y
County RE/Time FE	N	N	Y	Y	Y	Y
Observations	59394	59394	59394	59394	59394	59394
R^2 adjusted	0.466	0.47	0.536	0.536	0.536	0.536
AIC	125383	124963	118248	118247	118248	118250

Appendix C: Model Results Using Fixed Effects Model specification

Table 5. Model Results on Fixed Effects Model Specification				
DV: log($raised)	(3)	(4)	(5)	(6)
Direct Gaze	0.0256 ** (0.0101)	0.0625 *** (0.0223)	0.0372 (0.0227)	0.0255 ** (0.0101)
Temporality	0.0106 (0.0093)	0.0165 * (0.0098)	0.0106 (0.0093)	0.0106 (0.0093)
Spatiality	0.0168 * (0.0092)	0.0167 * (0.0092)	0.0186 * (0.0097)	0.0168 * (0.0092)
Cognitive Tension	0.0211 *** (0.0034)	0.0211 *** (0.0034)	0.0211 *** (0.0034)	0.0216 *** (0.0036)
Direct Gaze * Temporality		-0.0457 *		

		(0.0245)		
Direct Gaze * Spatiality			-0.0142 (0.0249)	
Direct Gaze * Cognitive Tension				-0.0042 (0.0103)
Intercept	7.2136 *** (0.8647)	7.2075 *** (0.8647)	7.2124 *** (0.8647)	7.2145 *** (0.8647)
Medical Issues	Y	Y	Y	Y
Fundraiser Nature	Y	Y	Y	Y
Controls/Share	Y	Y	Y	Y
County RE/Time FE	Y	Y	Y	Y
Observations	59394	59394	59394	59394
R^2 adjusted	0.518	0.518	0.518	0.518
AIC	142106	142104	142107	142108

Appendix D: Model Results Using a Split Sample for Campaigns with Human Face Image.

Table 6. Model Results on Split Sample for Campaigns with Human Face Image				
DV: log($raised)	**(3)**	**(4)**	**(5)**	**(6)**
Direct Gaze	0.0204 ** (0.0099)	0.0650 *** (0.0219)	0.0323 (0.0223)	0.0204 ** (0.0099)
Temporality	0.0148 (0.0098)	0.0234 ** (0.0105)	0.0148 (0.0098)	0.0148 (0.0098)
Spatiality	0.0153 (0.0098)	0.0153 (0.0098)	0.0175 * (0.0105)	0.0154 (0.0098)
Cognitive Tension	0.0210 *** (0.0036)	0.0211 *** (0.0036)	0.0210 *** (0.0036)	0.0217 *** (0.0039)
Direct Gaze * Temporality		-0.0552 ** (0.0242)		
Direct Gaze * Spatiality			-0.0146 (0.0246)	
Direct Gaze * Cognitive Tension				-0.0051 (0.0102)
Intercept	8.1791 *** (0.0916)	8.1714 *** (0.0917)	8.1774 *** (0.0917)	8.1790 *** (0.0916)
Medical Issues	Y	Y	Y	Y
Fundraiser Nature	Y	Y	Y	Y
Controls/Share	Y	Y	Y	Y
County RE/Time FE	Y	Y	Y	Y
Observations	59394	59394	59394	59394
R^2 adjusted	0.515	0.515	0.515	0.515
AIC	119278	119275	119280	119280

Appendix E: Model Results Using a Split Sample for the Campaigns with at Least 1 Share.

Table 6. Model Results on Split Sample for Campaigns with at Least 1 Share				
DV: log($raised)	**(3)**	**(4)**	**(5)**	**(6)**
Direct Gaze	0.0344 *** (0.0105)	0.0735 *** (0.0233)	0.0548 ** (0.0240)	0.0344 *** (0.0105)
Temporality	0.0121 (0.0098)	0.0186 * (0.0104)	0.0122 (0.0098)	0.0121 (0.0098)

Spatiality	0.0233 ** (0.0097)	0.0232 ** (0.0097)	0.0265 ** (0.0103)	0.0233 ** (0.0097)
Cognitive Tension	0.0225 *** (0.0036)	0.0225 *** (0.0036)	0.0225 *** (0.0036)	0.0230 *** (0.0038)
Direct Gaze * Temporality		-0.0481 * (0.0257)		
Direct Gaze * Spatiality			-0.0248 (0.0262)	
Direct Gaze * Cognitive Tension				-0.0045 (0.0108)
Intercept	8.1803 *** (0.0856)	8.1748 *** (0.0857)	8.1779 *** (0.0857)	8.1802 *** (0.0856)
Medical Issues	Y	Y	Y	Y
Fundraiser Nature	Y	Y	Y	Y
Controls/Share	Y	Y	Y	Y
County RE/Time FE	Y	Y	Y	Y
Observations	59394	59394	59394	59394
R^2 adjusted	0.488	0.488	0.488	0.488
AIC	121012	121011	121013	121014