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THE POWER OF COLLECTIVE ENDORSEMENTS:
PROMOTING CREDIBILITY, BELONGING, AND PARTICIPATION IN MEDICAL
SUPPORT COMMUNITIES

BY

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DISSERTATION

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ABSTRACT

Medical costs are the leading cause of bankruptcy in the United States. Recently, crowdfunding sites such as GoFundMe have helped reduce medical bankruptcies across the United States by allowing people to easily create a personal campaign webpage and raise funds from a large number of people on the Internet. One notable GoFundMe campaign, created by a family with a son who needs stem cell treatment, raised over \$250,000 in a week and has been shared over 4,000 times. How can an individual's medical story shared on the Internet attract such a large number of people – including strangers – to support the patient? My thesis addresses this issue through several different angles: credibility, social translucency, and community participation. Tying these three themes together is the concept of collective endorsements.

I introduced the concept of collective endorsements while investigating the factors that influence the perceived credibility of medical crowdfunding campaigns. Establishing the credibility of medical crowdfunding campaigns is very important because many potential supporters often worry about participating in fraudulent campaigns. In particular, strangers who do not have any personal relationship with the patient often have difficulty evaluating the campaign's credibility due to their limited ability to verify the patient's medical situation. Collective endorsements offer an alternative way to assess the patient's medical situation through a collection of evidence: what many people say and do around the patient. In medical crowdfunding campaigns, however, most collective endorsements, such as campaign shares and offline support, are not visible to many other current and potential supporters because they occur outside of crowdfunding sites. Therefore, drawing from social translucence theory and impression management theory, I examine various ways to design interfaces that can make these invisible collective endorsements visible on medical crowdfunding campaigns. Finally, I design and build the Community Journey crowdfunding interface that highlights all of a patient's collective endorsements. With Community Journey, I show that strangers feel a significantly greater sense of community and are more willing to contribute on Community Journey than on a traditional medical crowdfunding interface.

To my family, for their love and support.

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My research is about medical crowdfunding where many people come together to help patients achieve their goal. This is exactly how my Ph.D. life was. My family, advisor, committee members, every single member in the Social Space group, whole UIUC HCI group, and my co-workers came together to help me achieve this goal.

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CHAPTER 1: INTRODUCTION

In the United States, where universal health coverage is not the norm and patients often pay high out-of-pocket medical costs, medical expenses are the biggest cause of the personal bankruptcies. Recently, patients and their families have raised substantial sums to defray their out-of-pocket medical costs using online crowdfunding sites such as GoFundMe. Medical crowdfunding sites help people create a personal campaign webpage where they can write the patient's medical story and allow many people to share this campaign webpage on various social media sites to ask for support (Figure 1.1). The structure of contemporary social media has accelerated collective community support as it provides a rich ground for spreading a story. For example, one notable GoFundMe campaign, created by a family with a son who needs stem cell treatment, raised over \$250,000 in a week and has been shared over 4,000 times on social media. This viral nature of collective community support has lowered the medical bankruptcy rate in the United States [1].

Before medical crowdfunding sites existed, patients asked people in online health communities or their personal social networks for support directly [2, 3, 4, 5, 6, 7, 8]. Literature on existing online health support communities suggests that people who feel a stronger sense of belonging to their community are more likely to provide valuable support, such as sympathetic emotional support or informational support, to other community members [9, 10]. People who feel more connected to the patients social network give more intimate emotional support as they possess in-depth knowledge about the patient [6, 11, 12, 8]. Therefore, it is important to develop a sense of community in these online support groups to facilitate more valuable contributions [13, 14]. Researchers have found that this sense of community can be developed through frequent interactions among community members or by reading other members' messages [15]. Furthermore, simply being aware that many people are participating in a community can increase community members attachment and allow them to disclose more information about themselves to the community [9].

However, establishing a sense of community is difficult in medical crowdfunding campaigns. Because a large proportion of medical crowdfunding activities (campaign promotions) happen outside of the campaign – across various social media sites, online communities, and even offline sites – these activities are not often visible to other supporters. For example, when a supporter asks for donations on Instagram, only the supporters friends on Instagram can see this promotion. Other supporters who are on other social media sites, online support groups, or offline sites cannot see this activity. This invisibility of campaign promotions in medical crowdfunding campaigns makes it difficult for supporters to develop a sense of community.

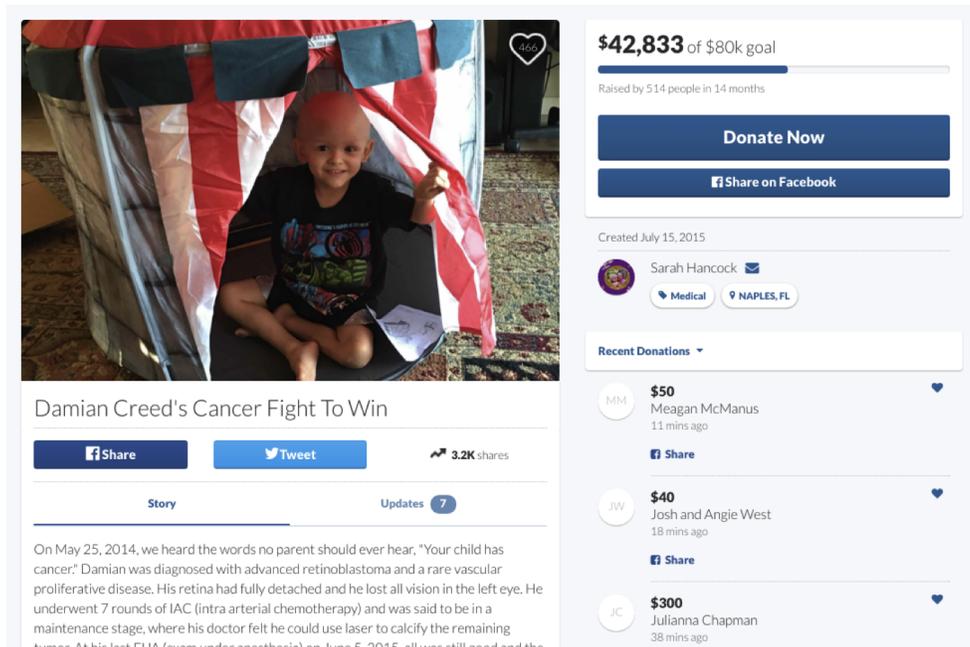


Figure 1.1: An example of an online medical crowdfunding campaign on GoFundMe: Fundraisers describe the patients situation, explain the need for raising money, state the fundraising goal, and upload pictures and updates.

Another challenge comes with potential supporters who do not have any relationship with the patient. Strangers may not feel connected to the patients medical crowdfunding community because they do not know the patient. Moreover, they may struggle with believing the patients medical story because they have limited information with which to verify the patients medical situation.

In my thesis, I investigate ways to increase participation in medical crowdfunding campaigns by promoting a sense of community and establishing the credibility of campaigns. In particular, I introduce the concept of collective endorsements in medical crowdfunding campaigns and show that they can (1) promote credibility, community, and participation in medical support communities; (2) bridge together online and offline support communities; and (3) become elements of the patient story. In the next section, I summarize my contributions and show how I fill the gaps between existing health support groups and medical crowdfunding by suggesting the concept of collective endorsements.

1.1 CONTRIBUTIONS

This dissertation makes the following three specific contributions.

1.1.1 Discovering Collective Endorsements

Traditional approaches of evaluating credibility focus on assessing the authors expertise or the professionalism of the online content. However, in Chapter 3, I found that people determine a medical crowdfunding story’s credibility by what people say about the patient and what they do for them. For example, I found that a collection of messages and pictures about the medical crowdfunding patient shared by people on the Internet influences the credibility of the patient’s medical story. For example, medical crowdfunding supporters depicted the patient’s identity when they promoted the patient’s story on social media or online communities by mentioning the patients personality (e.g., the most loyal and fun-loving person) or organizations to which they belonged (e.g., a member of our dance club). Furthermore, supporters posted pictures of themselves visiting the patient in the hospital, serving food, or organizing offline fundraising events on a Facebook page to encourage other supporters to join them. These kinds of messages and pictures, which I call collective endorsements, collectively endorsed the credibility of the patient’s story.

However, most support provided to medical crowdfunding campaigns, such as campaign shares and offline support, is not visible to many other current and potential supporters as it occurs outside of the crowdfunding sites. In Chapter 4, I show that this invisible element of collective endorsements, which I call outside support, left patients struggling to signal the credibility of their story and potential supporters unaware of outside support opportunities.

1.1.2 Designing Social Translucency into Collective Community Support

This thesis contributes to designing socially translucent systems using three building blocks of social translucence theory: visibility, awareness, and accountability. In Chapter 5, applying social translucence theory, I explore design spaces for making outside support visible on medical crowdfunding campaigns. By developing and evaluating three different functional prototypes that emphasize the details and impacts of, as well as opportunities for outside support, I show that the design features emphasizing supporters’ messages increased a sense of community, whereas highlighting contribution amount promoted a judgemental attitude.

In Chapter 6, I further show that presenting details of collective endorsements can communicate rich stories about the patient. They unexpectedly reveal background information about the patient such as patient’s personality, hobbies, and relationships from the perspectives of supporters.

1.1.3 Community Participation

My thesis contributes to the interface designs that can increase the sense of community and the participation of newcomers. In Chapter 7, I present the Community Journey interface that I developed based on the sense of community theory as well as findings from Chapters 5 and 6. Community Journey presents outside support on a crowdfunding interface by highlighting each supporter's involvement in the patient's medical journey. I show that Community Journey increase strangers' sense of community within a medical crowdfunding campaign as well as their participation.

1.1.4 Ethics & Privacy Considerations

My thesis suggests several ethical considerations that researchers can encounter while conducting social computing research dealing with patients' medical information and social media data. At the end of the chapter 5, 6, and 7, I discuss ethical issues that should be considered when incorporating outside social media data into a medical crowdfunding campaign. This includes privacy issues with collecting, aggregating, and presenting publicly available social media data for a research purpose. I also discuss the importance of ensuring medical crowdfunding patients' privacy when designing a new crowdfunding interface.

1.2 STRUCTURE OF THE DISSERTATION

This dissertation consists of eight chapters, the first being this Introduction. Chapter 2 reviews a large body of background work on health collective support practices, including a literature review that integrates existing research from the fields of human-computer interaction, social support for patients, and distributed collective work. In Chapter 3, I uncover the concept of collective endorsements by investigating the cues that people rely on when assessing the credibility of a medical story described in medical crowdfunding campaigns. The Chapter 4 explores the challenges that patients and supporters face because the distributed nature of collective support activities of medical crowdfunding. To investigate ways to recognize the distributed collective support, in the Chapter 5 & 6, I present and evaluate three different types of medical crowdfunding interface prototypes that are designed inspired by self-presentation and social translucence theory. By evaluating three functional prototypes, I show that presenting support details such as supporter names, messages, and pictures on medical crowdfunding campaigns facilitates telling stories about the patient's identity and allows supporters to feel more sense of belonging to the medical crowdfunding campaign. In

Chapter 7, I finally present Community Journey, a web-based application that can facilitate rich storytelling about the patient’s identity. I show that Community Journey enhances strangers’ sense of community and thus promotes their contributions. In the final chapter I conclude this thesis by describing the limitations and future directions of my work.

In this thesis, I show that collective endorsements – a collection of what people say and do around the patient – can establish the perceived credibility of medical crowdfunding campaigns. Collective endorsements can also serve as the credibility signals in other domains such as online reviews or social media shares of a news article about certain health information or political figures. However, at the same time, people should be aware of the danger that these collective endorsements can be fabricated. In politics especially, collective endorsements have been fabricated using automated social media accounts, so-called bots. For example, in the United States 2016 presidential election, Twitter bots were intentionally spreading fake information or malicious content about particular political figures to influence public opinion. With the possibility of fabricated or misused collective endorsements in mind, future research should examine how we can establish more supportive and trustworthy sociotechnical systems using collective endorsements.

CHAPTER 2: LITERATURE REVIEW

This thesis aims to understand and build socio-technical systems that can promote credibility, collaboration, and participation in collective community support practices. Below, I first review the literature about crowdfunding and online health support to understand unique characteristics of medical crowdfunding in the area of collective community support. I then review existing literature about credibility, social translucence, and increasing participation to understand.

2.1 COLLECTIVE COMMUNITY SUPPORT

This thesis investigates medical crowdfunding practices as an example of collective community support. I first introduce medical crowdfunding as reviewing existing crowdfunding research and health support group.

2.1.1 Crowdfunding

Crowdfunding is an internet-based open call for donations from a distributed network to support specific purposes [16]. Crowdfunding sites such as GoFundMe enabled collective support practices by allowing people to easily create an individual campaign webpage where they can set their funding goal, describe reasons for raising funds, and share the campaign webpage to various online and offline sites. Using a set of interface features (e.g., a profile photo or a campaign description) provided by crowdfunding sites, campaign creators present the beneficiary’s medical and financial situations to signal the image or impression they want to convey. People who saw this shared webpage visit this campaign webpage, read the story, and decide whether to support this campaign by donating money, sharing this campaign to their social network, or contributing other ways [17]. When people decide their support, social signals in medical crowdfunding such as profile photos or writing styles of the campaign may (or may not) motivate them to donate to the campaign.

People use crowdfunding sites for a variety of purposes such as fundraising for medical expenses, entrepreneurial work, education, or civic purposes. A large body of research in crowdfunding focuses on entrepreneurial crowdfunding which requests funds in exchange for a business venture’s art, products, or services [18]. The infrastructure underlying entrepreneurial and medical crowdfunding campaigns share many similarities; both campaign creators describe reasons for raising funds and allow anyone to share a campaign URL on so-

cial media sites to solicit donations from a wider set of audiences. Despite their similarities, differences in their crowdfunding models, campaign legitimacy work, and the involvement of the beneficiaries in crowdfunding campaigns suggest unique support opportunities in medical crowdfunding campaigns.

Crowdfunding Models

Kickstarter, the largest entrepreneur crowdfunding platform, uses an all-or-nothing model where campaign creators can only receive collected funds if a campaign goal is reached within a certain fundraising period [38]. This can prevent fundraisers initiating a campaign, because the effort put into a campaign could become useless [18, 16]. Thus, much of entrepreneurial crowdfunding research investigates various success factors such as funding goal amount [19], frequent updates [20], and importance of early donations [21]. Past work has also found that signals of the fundraiser’s social capital, such as social network size, and the number of Facebook likes for a project page, are correlated with crowdfunding success [19].

On the other hand, medical crowdfunding sites such as GoFundMe, YouCaring, and GiveForward use a direct donation model where fundraisers keep all donations even if the total does not reach the goal amount. Thus, medical crowdfunding donors may have less motivation to contribute money through a crowdfunding website, as they could directly donate to the beneficiary to avoid the service fees. However, the publicly displayed donor names and donation amounts on medical crowdfunding campaigns may motivate the beneficiaries’ close friends to contribute money to the campaigns [22]. The donation amount often signals a strong connection between the beneficiary and their supporters [23, 24].

Campaign Legitimacy Work

Both entrepreneurial and medical crowdfunding fundraisers put significant effort into conveying the legitimacy of their crowdfunding campaigns to potential donors [25]. Previous entrepreneur crowdfunding research [16, 26, 19, 20] highlights the importance of specifying reward structures in campaign description and updates to increase the likelihood of crowdfunding success. In addition, the quality of materials of the campaign (e.g., videos and grammar accuracy) was associated with the likelihood of success in fundraising [19]. Thus, entrepreneurial fundraisers put extensive effort in preparing and examining campaign materials before launching a campaign [27]. Fundraisers often ask for advice from other fundraisers who have succeeded before, study advice blogs, or hire professionals to prepare high quality campaign materials [27]. However, Kim et al. found that potential donors did

not expect high quality work on campaign materials in the context of medical crowdfunding [28]. Instead, campaigns that signal the legitimacy and worthiness of the beneficiary as well as his or her own contributions are helpful in attracting donors [29, 28, 25].

Beneficiaries Involvement throughout Fundraising

Entrepreneurial crowdfunding creators are often the beneficiaries of the collected funds [25]. Because the beneficiaries are in charge of creating products or services that they raise funds for, they spend a significant amount of time attracting supporters both online and offline [18]. However, medical crowdfunding beneficiaries, often the patients and their family, are not be able to create and run a campaign as they are often going through difficult medical situations (e.g. surgery, cancer treatment, or staying in an intensive care unit). The beneficiaries may need more help from their supporters to promote and even create a campaign on their behalf. Despite the important role of the supporters in medical crowdfunding campaigns, researchers have not yet explored how supporters help beneficiaries to solicit and receive financial support.

Presentation in Crowdfunding

Crowdfunding research has largely focused on entrepreneurial crowdfunding campaigns where fundraisers solicit donations in exchange for rewards in the form of products or services. Contributors of entrepreneurial crowdfunding campaigns often donate money to collect these rewards [18]. Thus, in entrepreneurial crowdfunding, cues signaling the fundraiser’s expertise and reward quality are associated with the success of campaigns. Such cues include updates about the reward status [20], the fundraiser’s success ratio in past campaigns [30], grammatical accuracy in the campaign description [19], and video quality [31].

In contrast to entrepreneurial crowdfunding, the purpose of medical crowdfunding is to raise funds for a beneficiary’s medical expenses. Thus, potential contributors of medical crowdfunding do not expect high-quality materials because they understand that beneficiaries lack the time and energy to generate them due to their difficult medical situations [28]. Moreover, unlike entrepreneurial crowdfunding, medical crowdfunding beneficiaries may feel embarrassed about revealing the purpose of their fundraising: personal medical and financial difficulties. Although some people prefer to share their medical concerns anonymously [32] or emphasize the positive side of their difficulties [4], medical crowdfunding beneficiaries are expected to publicly disclose their real name and the seriousness of their medical situations. In this work, we investigate how beneficiaries present their situation on medical

crowdfunding campaigns to convey why they deserve support and how contributors perceive the presented information.

2.1.2 Medical Crowdfunding as Health Support Communities

Not only do online medical crowdfunding sites facilitate monetary donations, but they also allow patients to receive other types of support from their social network. Thus, we want to understand the extended types of support that occur through medical crowdfunding sites. First, we introduce a theoretical framework that provides a lens for understanding social support in the context of health. We then discuss how social support for health takes place online and the key differences between online health communities (OHCs) and medical crowdfunding sites. Finally, we suggest unique support opportunities in medical crowdfunding by highlighting the differences between medical and other types of crowdfunding campaigns.

Social Support for Health

Medical support communities provide a variety of social support including emotional, informational, and instrumental support. A long history of research has shown a positive relationship between the availability of social support and health outcomes.

Patients seek and receive social support from their social networks to cope with their health difficulties [33, 34, 12]. Social support is often characterized as a multidimensional concept consisting of structural (e.g., social network resources and affiliations), functional (e.g., instrumental, emotional, and informational forms of support), and perceptual (e.g., satisfaction) dimensions [35]. A supportive social network provides various types of support by investing both tangible and intangible resources. Although medical crowdfunding sites are specifically designed to facilitate tangible support, such as monetary donations, we are interested in exploring social support beyond monetary donations in medical crowdfunding sites. To understand how and why extended social support occurs, we first examine a framework that defines social support as outcomes of social capital [33]. According to Carpiano's framework, the amount of social support that individuals can access depends on (1) social cohesion: patterns of social interaction and values (e.g., networks, norms, and social trust) and (2) social capital: actual and potential resources that are possessed within one's social networks (e.g., time, money, and knowledge) [5]. We seek to understand how people utilize social cohesion and social capital in the context of medical crowdfunding. We also examine limitations of existing medical crowdfunding sites that affect the support-seeking and

support-giving behaviors.

Online Health Community

Online health communities facilitate the exchange of emotional and informational support through members of social networks who possess relevant knowledge and experience [6, 3, 36, 8, 37]. For example, Online health communities connect patients with people who have had similar medical experiences [3, 36, 37]. From peer-patients, patients receive more sympathetic emotional support and/or unique informational support about managing the everyday experience of illness that even clinicians often cannot provide [38, 37]. On the other hand, the patient's close networks that possess in-depth knowledge of and experience with the patient's personality or daily life, provide more intimate emotional support that peer-patients cannot offer [12, 8]. Thus, personal health blogs such as Caring Bridge [39] and Lotsa Helping Hands [40] allow patients to only invite people whom they can trust [6, 8]. Patients then share their health journey to a selective audience and receive emotional support [6].

Online Health Community vs. Medical Crowdfunding Campaigns

In contrast to Online health communities where patients typically share their health concerns directly with a closed group, medical crowdfunding requires promotion to reach out to potential donors outside of the medical crowdfunding sites. In this process, unique social support opportunities can arise. For example, patients' supporters who have many social media friends can support the patients by sharing their campaigns. In our research we investigate the types of support that supporters provide while participating in medical crowdfunding campaigns and how and why this support occurs.

2.2 CREDIBILITY

Medical crowdfunding is a form of personal fundraising campaigns that migrate to online platforms. Ensuring the credibility of charitable fundraising has presented a challenge for decades. In this section, I first cover how traditional charitable organizations establish credibility, and then present how users evaluate credibility on several online platforms.

2.2.1 Charitable Fundraising and Credibility

Traditional charities such as ChildFund, Compassion, and Red Cross use other strategies to signal credibility. For example, Compassion [41] sends personal correspondence from the beneficiary to the donor, and ChildFund utilizes celebrity endorsements as a proxy for credibility [42]. Additionally, watchdog agencies monitor and assist the charities' adherence to ethical standards. The Better Business Wise Giving Alliance (www.give.org), one of the best-known watchdog agencies, evaluates organizations based on 20 factors covering governance and oversight, effectiveness, financial management, and informational material [43]. Potential donors often rely on watchdog agency approval as a credibility signal for charity organizations and their campaigns [44]. However, neither the watchdog agencies nor the charities report how they measure the credibility of the beneficiaries and the health claims in individual campaigns.

2.2.2 Web Credibility Studies

The perceived credibility of information on the Internet has been extensively studied in the context of various online media including webpages, Twitter, and Wikipedia. Metzger categorized credibility evaluation online into two levels: the level of the Web site as a whole [45, 46] and the level of messages residing on Web sites [47]. Fogg focused on the level of the website as a whole and found that most people evaluated the site's credibility via design-related factors [46]. Conversely, people use logic factors such as argument plausibility [47] more often to evaluate the perceived credibility of information/messages within websites. Studies examining perceived credibility factors at the message level, such as tweets, identified distinctive credibility factors based on the site's purpose. For example, Morris et al. found that rather than relying on the credibility of Tweet content alone, users were influenced by the author's username [48]. Wikipedia is another example where users use distinctive factors to evaluate credibility. Wikipedia users rely on the article's author-editing history [49] and hidden article information [50].

This thesis investigates online medical crowdfunding campaigns created not by established organizations but by individual fundraisers. The emergence of these online campaigns by individuals presents the need for identifying new credibility factors. Therefore, in Section 3, I investigate current practices in assessing the credibility of online medical crowdfunding campaigns.

2.3 SOCIAL TRANSLUCENCE

Social translucence theory argues that online collaboration systems should make contributors' activities visible to better achieve a common goal. Currently in medical crowdfunding sites, various outside contributions integral to the success of a campaign, such as campaign promotions and offline support, are less visible than monetary contributions to fellow contributors. This visibility imbalance among different types of contributions presents social challenges such as lack of awareness about non-monetary contribution opportunities and underestimating their value [17]. To address the visibility imbalance problem, this section reviews social translucence theory and how existing socio-technical systems employ social translucence to make the invisible activities visible.

Social translucence refers to the practice of making socially relevant information visible to everyone on a sociotechnical system in order to influence the way people interact with others [51]. For example, disclosing users' contextual information in instant messaging (IM) such as a user's current location or availability helps other users to easily start a conversation [52]. On the other hand, revealing such information often raises privacy concerns [53]. Therefore, HCI researchers have extensively studied appropriate ways to make various types of information visible on sociotechnical systems [54, 55, 56, 50, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66].

2.3.1 Supporting Social Translucence using Visualizations

Achieving the right level of visibility in socio-technical systems is a challenge, as simply revealing more data does not imply supporting social translucence. In fact, showing more data can actually lower the visibility for large datasets where meaningful data is buried under a large amount of non-significant data [67]. In these situations, aggregating data over meaningful dimensions and visualizing the results can help reach the desired level of visibility.

Researchers have visualized online communities to obtain a sense of the culture and patterns of the community without reading through years' worth of posts [68, 66, 65]. Visualizations often depicted contributions such as posts on Usenet [65, 68, 61], code lines on Github [69, 70], and articles on Wikipedia [50, 60, 25]. Although these contributions are already embedded into the infrastructure or visible on the site, the visual representations uncover patterns of data (e.g., trends and outliers) that are hard to detect in textual representations [70, 50, 49, 60, 61, 63, 62, 64].

Contribution-based visualizations often show the distribution of contributions by members and/or over time (i.e., history). AuthorLines displays contributions of a single member

by showing a double histogram of one’s annual post activity [65] while Newsgroup Crowds visualization depicts the distribution of contribution over members [61]. Other works combine the distribution of contribution by members and over time in a single visualization. History flow visualization, which displays contributions by members on a timeline increased visibility as previously unknown patterns of social activity emerged, such as edit wars and article vandalism [66]. This type of visualization has been revived recently as DocuViz, an app that visualizes revisions of collaborative writing on Google Docs to assist authors, instructors, and researchers [64]. Github uses visualizations to show the history and members of a project using a timeline view. Developers use the activity history to make sense of the project structure and the roles of the contributors. This further allows contributors to make social inferences about fellow contributors’ expertise and working style [55, 69, 71]. These details even assisted employers in assessing potential employees during the recruiting and hiring process [69].

All of the previous work on contribution visualization has focused on contributions that are embedded into the infrastructure and visible on the system. However, medical crowdfunding campaigns involve contributions that reside out side of the ecosystem of the current inhabited system: outside contributions. Based on prior work on contribution visualization, in Section 6, I investigate ways to make these outside contributions visible on the system and thereby explore the impact of enriched social translucence of the community.

2.4 PROMOTING COMMUNITY AND PARTICIPATION

Online community members are likely to provide valuable contributions when they feel a strong sense of community to the community members [15, 37, 72, 10]. For example, they respond to the questions in online health support communities [37, 72, 10], contribute reviews in movie rating systems [13], make edits in Wikipedia [50], and donate money on crowdfunding campaigns [73, 18]. Therefore, building a sense of community to online community members has been a long interest for HCI researchers.

McMillan & Chavis define a sense of community through four elements [15]: membership, influence, fulfillment of need, and shared emotional connections. Adopting this model, HCI researchers have investigated community building practices in a wide range of social technology [74, 75, 76, 77, 78]. For example, in video game live streaming, live streamers put a significant effort to emphasize their own personality when communicating with their audiences because audiences who have similar personality are drawn to those streamers [74]. In stigmatized crowdfunding campaigns that are created to raise funds to support or against individuals who share the same value to the campaign are more likely to donate more money

on the campaign [73]. Furthermore, to promote a sense of community by fulfilling the needs of members, community acknowledges members by providing a star icon to valuable posts [76] or recognizes the members in front of the entire community members [18].

However, few studies have investigated the interface design features of community that can promote members' sense of community and participation [13, 14]. Ren and her colleagues examined two sets of community features to build attachment of community members – increasing either group identity or interpersonal bonds. To strengthen group identity, interface design features such as tools for group-level communication and for increasing interpersonal bonds, the interface features leveraging interpersonal communication were tested. Although both interface features increased members' attachment to the community and promote participation, identity-based features had stronger effects than bond-based features. Another study by Frazan et al. designed bond-based and identity based interface features on the game setting where a group of people play a tetris game together [14]. They also found that simple designs changes that highlight either individual members or the community as a whole increase community members' commitment.

My work investigates the crowdfunding interface designs that can promote a sense of community based on four elements of a sense of community model – membership, influence, fulfillment of need, and shared emotional connections. In Chapter 7, I show Community journey, that designs each element of the sense of community model into a crowdfunding campaign interface.

CHAPTER 3: UNCOVERING COLLECTIVE ENDORSEMENTS

Traditional medical fundraising charities have been relying on third-party watchdogs and carefully crafting their reputation over time to signal their credibility to potential donors. As medical fundraising campaigns migrate to online platforms in the form of crowdfunding, potential donors can no longer rely on the organization's traditional methods for achieving credibility. Individual fundraisers must establish credibility on their own. Potential donors, therefore, seek new factors to assess the credibility of crowdfunding campaigns. Therefore, this chapter contributes to the field of online credibility by investigating current practices in assessing the credibility of online medical crowdfunding campaigns.

3.1 RESEARCH QUESTION

What are the main factors that influence perceived credibility in online medical crowdfunding campaigns?

3.2 METHODOLOGY

To evaluate how people judge the authenticity of medical crowdfunding campaigns, I first searched for medical crowdfunding campaigns that are publicly promoted on various social media sites such as Facebook, Twitter, and Reddit. When campaigns are promoted on social media sites, people often write comments encouraging patients, asking questions, or questioning the credibility of the promoted campaigns. Among those campaigns, the campaigns shared on Reddit received more comments questioning the credibility compared to other campaigns promoted on Facebook and Twitter. For example, 24.4% of the medical crowdfunding campaigns that were shared and commented on Reddit spurred active credibility discussion. Therefore, I first analyzed comments on Reddit to understand how people evaluate the credibility of medical crowdfunding campaigns. I then conducted semi-structured interviews to identify how people who are not associated with Reddit assess the credibility of medical crowdfunding campaigns. Below, I describe the two phases analysis procedures: a Reddit comment analysis and semi-structured interviews.



Figure 3.1: An example of a Reddit post: clicking the Reddit post’s title redirects users to a corresponding campaign page on a medical crowdfunding site. The comment shown in the figure questions the credibility of the campaign.

3.2.1 Reddit Comment Analysis

Fundraisers often submit their crowdfunding campaign’s link to one or more subreddits. Common content areas are centered around charity, donation, military, and cancer subreddits. Redditors comment on each other’s posts, sometimes leading to active discussions (see Figure 3.1). Although discussions weighted with skepticism can lead to biased debates, they still reveal important weaknesses in a campaign that could affect its credibility. While medical crowdfunding sites also provide a comments feature for interactions between fundraisers and potential donors, donors often use this feature to leave encouraging notes for the beneficiary rather than to discuss the credibility of the campaign. Reddit comments provided a window into credibility issues surrounding the campaigns that would otherwise be difficult to observe. The following three steps describe how I extracted our campaign sample, identified comments criticizing campaign credibility, and categorized the comments.

Step 1. Extracting Medical Crowdfunding Campaigns

To collect comments corresponding to medical crowdfunding campaign-related posts on Reddit, I first investigated posts that contained links to external crowdfunding sites. Our empirical observation suggested that most of these posts pointed to one of the five major crowdfunding sites with a “medical” funding category—GiveForward, YouCaring, GoFundMe, Fundly, and Life.indegogo.

On July 9, 2015, I collected all the Reddit posts (N=1,542) linked with these five sites’

URLs (see Table 3.1) using the Reddit API. Fundraisers often cross posted campaigns over several different subreddits. I considered duplicate posts as one post and combined all the comments for the post.

Although I extracted posts containing links to the medical crowdfunding sites, our initial collection of 1,542 posts also contained entrepreneur, travel, and education crowdfunding campaigns. To separate the campaigns soliciting money for medical purposes, I first made a list of inclusion keywords based on the medical fundraising categories listed on the GiveForward website (e.g., “medical,” “cancer,” “surgery,” “accident,” “transplant,” etc.). I then randomly sampled 100 posts from the initial collection and examined the linked campaigns to establish a definition of medical crowdfunding campaigns and to refine the list of inclusion keywords.

Initially, our definition of medical crowdfunding campaigns included those covering medical expenses for a patient’s surgery and treatments. After two researchers read and discussed the 100 sampled campaigns, our final definition of medical crowdfunding campaigns expanded to include medical, living, and/or travel expenses relating to a patient’s surgery, treatment, medicine, or medical equipment. The definition excluded campaigns for family resettlement, adoption, and pet-related medical expenses. Our inclusion keywords included “diagnosed,” “injury,” and “Lyme disease.” The exclusion keywords included “dog,” “cat,” and “bunny.”

After the first round of filtering for medical crowdfunding campaigns, we achieved 93% accuracy. We also reviewed false negative and false positive samples from the filtered campaigns. The false negative samples yielded additional inclusion keywords, including “prosthetic,” “treatment,” and “heart failure.” Similarly, we used the false positive samples to identify additional exclusion keywords. In the third round of filtering, we achieved 95% accuracy. Finally, we subsequently removed 31 additional campaigns, including those that sought to raise medical funds for natural disasters, children living in developing countries, and homes damaged in fires. This process resulted in a final pool of 618 identified medical crowdfunding campaigns linked to Reddit posts (see Table 3.1).

Step 2. Identifying Comments Criticizing Credibility

The 618 medical crowdfunding campaigns selected in Step 1 were linked to 1,830 comments. Two researchers first read 500 randomly selected Reddit comments from this pool and came up with the following definition of comments expressing skepticism: 1) explicitly mentions that a campaign is suspicious, 2) asks for more information, clarification, or verification of the information provided in a campaign, and/or 3) points out incorrect or exaggerated information. Thus, the scope of our analysis is the subset of Reddit comments

that question the credibility of medical crowdfunding campaign posts. Two researchers individually coded 800 randomly selected Reddit comments to identify whether each comment was expressing skepticism using the above definition. After two rounds of coding, we achieved a Cohen’s kappa coefficient of $k=0.94$. One of the two researchers then coded the rest of the comments and identified 149 Reddit comments expressing skepticism out of the 1,830 Reddit comments. Other comments showed support for the patients and fundraisers, demonstrated empathy, or requested sharing a campaign to other online sites. As shown in Table 3.1, among the campaign posts that received at least one comment ($N=303$), 24.4% of them ($N=74$) received comments expressing skepticism.

Step 3. Categorizing Comments Criticizing Credibility

To better understand the nature of the credibility concerns surrounding medical crowdfunding campaigns, two researchers highlighted all the statements in the comments that provided explanations for the criticism. We then coded them using an inductive process [79]. We conducted multiple passes over the codes, refining them until we began to see broader patterns in the data. We discussed the codes between each pass and developed themes. These themes were translated into our categorization scheme to determine credibility factors based on the expressed reason behind the skepticism (see Table 3.2). We re-read all comments to assign them to a category.

3.2.2 Interviews

I conducted interviews to assess how the credibility factors impact people’s perceived credibility of medical crowdfunding. To recruit participants, I posted flyers at various public places and sent emails to local communities. I recruited 20 participants (10 females and 10 males, Mean age = 28.8, SD age = 6.2) consisting of three university staff members, eleven graduate students, three undergraduates, one visiting scholar, and two office workers. All participants had previously observed and considered contributing to medical crowdfunding campaigns. Ten of the participants had not donated to a campaign. Their stated reasons for not having donated in the past included the uncertainty of the campaign’s credibility ($N=7$) and/or the lack of money ($N=3$). The length of the interviews ranged from forty minutes to one hour. I recorded and transcribed the interviews, and compensated the participants with \$10 Amazon gift cards.

Table 3.1: Total number of 1) crowdfunding campaigns, 2) medical campaigns, 3) medical campaigns received at least one comment on Reddit, and 4) medical campaigns received credibility comments posted on Reddit from each crowdfunding site.

| Number of crowdfunding campaigns posted on Reddit | All | <i>Medical only</i> | Medical with at least one comment | Medical with credibility comments |
|--|------------|----------------------------|--|--|
| GiveForward | 367 | 228 | 106 | 29 |
| YouCaring | 330 | 157 | 75 | 19 |
| GoFundMe | 511 | 158 | 94 | 21 |
| Fundly | 181 | 44 | 18 | 3 |
| Life.indegogo | 153 | 31 | 10 | 2 |
| Total | 1542 | 618 | 303 | 74 |

Selecting Medical Crowdfunding Campaigns

I selected six medical crowdfunding campaigns to trigger discussions about various credibility factors in the interviews. The selected campaigns contained different combinations of the credibility factors found from our Reddit comment analysis. I used six of the seven credibility factors (see Table 3.2) that I found in Step 3 to select the campaigns. I removed the “Others” category from the selection criteria because it was too general and covered unspecific topics. I balanced all of the credibility factors when selecting the example campaigns, and chose campaigns that were promoted on Reddit in order to focus on campaigns that targeted third-party potential donors. I selected three campaigns involving accidents and three involving medical conditions; these represented the most common funding needs in medical crowdfunding campaigns. Three campaigns were from GiveForward, and the others were from YouCaring, GoFundMe, and Fundly. I report more detailed information about each campaign in the Table 3.3.

Interview Procedures

To answer the research questions, the interviews addressed each participant’s previous experience in medical crowdfunding campaigns and the perceived credibility of the six campaigns. I conducted all the semi-structured interviews. I first asked participants about their experience viewing and donating to medical crowdfunding campaigns. If the participant

had never donated, I asked him/her to explain why. Then, participants were shown the six medical crowdfunding campaigns. They were allowed to (1) freely explore the campaign’s webpage, updates, and donors comments, (2) click on anything on the campaign page such as news article links, pictures, or videos and (3) search for more information on the Internet. Afterwards, they were asked to rate the campaign’s credibility on a 5-point scale on a paper (with 1 being the least credible and 5 being the most credible). While participants were browsing each campaign, I asked them to think aloud about the aspects of the campaign that led them to believe or to doubt its credibility. I also asked their criteria for evaluating the credibility of the campaign.

After participants explored all six campaigns, I asked follow-up questions about the credibility factors they mentioned to further understand how they related each factor to credibility. Additionally, if there were factors gathered from Reddit the participant did not mention, I informed them of the factors and asked them if they had considered them. I also asked how they believed these unmentioned factors might affect credibility. I only prompted participants with Reddit factors at the conclusion of each interview to mitigate potential bias. I closed the interview by asking participants for suggestions that could help them to better evaluate the campaign’s credibility.

Interview Data Analysis

One researcher who did not participate in the Reddit comment analysis conducted the interview data analysis to reduce bias in coding. The researcher thoroughly investigated interview transcripts and iteratively developed a classification scheme for the credibility factors. After the primary categories and subcategories were established, she used NVivo [80], an annotation tool, to classify sections of the interviews. Then a third researcher examined the classified sections to confirm the coding. The axial coding was used to finalize the categories and to derive additional credibility factors that were not mentioned in the Reddit comment analysis.

3.3 RESULTS

Through the Reddit comment analysis and interviews, I identified eleven credibility factors in medical crowdfunding campaigns (shown in Table 3.2).

Table 3.2: Perceived credibility factors of medical crowdfunding campaigns that are identified in both the Reddit comments and the interviews: “Both” indicates the factors are identified in both Reddit and the interviews. We calculated Reddit results based on the total number of comments, and the interview results based on the number of participants. One Reddit comment could be included in multiple credibility factors if the comment contained several statements about different credibility factors.

| Factors | Detailed Descriptions |
|--|---|
| | Examples of comments expressing skepticism regarding each factor |
| Seven factors common to the Reddit comments and the interviews | |
| Details of External Financial Support Reddit: N=33; 22% Interview: N=11; 55% | Both: Checking the beneficiary’s insurance coverage, or other financial support resources (e.g., government) “[...] As someone who's 17, she should certainly be covered under her parent's medical insurance, at the very least. There are of course costs insurance doesn't cover, but until there's some info it feels sketchy just pouring money into this fund” (R31). |
| Off-Site Verification Details (for Ailment, Incident, & Treatment) Reddit: N=31; 21% Interview: N=11; 55% | Both: Asking for details about the accident, the specific type of medical condition, current stages, possible treatments, and surgeries; verifying whether the beneficiary has the medical condition and/or whether the advocated treatment is necessary. “I mean...what is the surgery for? The name of the surgery implies a "cure". There is no cure. I know because I have CMT” (R78). |
| Realistic Funding Goals Reddit: N=29; 19% Interview: N=17; 85% | Both: Questioning a high monetary goal; requesting itemized budget of how the donation would be spent, Interview: Doubting low goal amount “You don't need \$1,300 in Thailand to treat it” (R40). |
| Redundancy in Campaign Description, Multimedia, & External Resources Reddit: N=25; 17% Interview: N=18; 90% | Both: Requesting external media sources or references such as pictures, videos, and news articles; checking for consistency between the campaign’s description and the external sources. “A lot of external links help. I guess it’s nice to see a lot of different articles say the same thing” (P8). |
| Beneficiary Merit Reddit: N=22; 15% Interview: N=3; 15% | Both: Blaming the beneficiary for not having insurance; checking for legal and moral liability in the accident, Reddit: Pointing out the beneficiary’s history or high income “Is there any actual proof this guy really has cancer? I mean he did rob a store for drugs - perhaps he (or someone) is trying to scam others. Just a thought” (R17). |
| Fundraiser and Beneficiary Identity Verification Reddit: N=21; 14% Interview: N=10; 50% | Both: Verifying whether the fundraiser and beneficiary are who they claim to be; warning of a fundraiser-beneficiary mismatch, Reddit: Mentioning the possibility of a scammer copying and pasting another’s legitimate campaign “It is a common scam for a non-affiliated party to hold a fundraiser where all the money lines the scammers pockets” (R9). |
| Others Reddit: N=8; 5% Interview: N=7; 35% | Both: Flagging without a specific reason; questioning a crowdfunding site’s reputation; pointing out grammar mistakes “If I was going to give money to strangers, I would look into GiveForward because it looks familiar” (P11). |
| Four factors unique to the interviews | |
| Communication between Donors & Fundraisers Interview: N=15; 75% | Interview: Posting many detailed updates from fundraisers; organizing offline meetings “I think [the fundraisers] should continue updates. Because they said they will use [donations for] some therapy or treatment. There is no feedback to the [donors]. I think update[s are] very important for their donation” (P10). |
| Presence of Personal Comments Interview: N=14; 70% | Interview: Looking for personal and long comments from donors “I do like this support activity portion. [Personal comments] give more credibility because if this [fundraiser] was [a] single person trying to steal money from people, it will be challenging to make all these personal comments, I believe. It will be more work for him” (P20). |
| Lower Professionalism Expectations Interview: N=12; 60% | Interview: Tolerating incorrect grammar and/or lack of professionalism “I don’t care about the grammar. Correct grammar is nice and preferred, but that doesn’t affect my judgment” (P12). |
| Appropriate Level of Emotion Interview: N=12; 60% | Interview: Feeling uncomfortable about excessive or insufficient expression of emotion “The big issue with [this campaign] is the lack of emotional description. It seems like you’re not related to the beneficiary. [...] I’ve doubts on campaigns that don’t have the appropriate amount of emotion” (P16). |

3.3.1 Credibility Factors

A credibility factor in a medical crowdfunding campaign is a feature that increases or decreases the campaigns' perceived credibility. The preliminary Reddit comment analysis revealed seven key credibility factors; the interviews revealed these same seven factors, and four more, for a total of eleven factors (see Table 3.2). The resulting Reddit comment analysis percentages are calculated from the total number of comments (N=149) and the interview percentages are calculated from the total number of interview participants (N=20). The following sections describe the factors in detail and the roles they play in evaluating the credibility of a campaign.

Details of External Financial Support

Insufficient and/or incorrect information about external financial support (e.g., insurance) was the most frequently mentioned factor (N=33; 22%) on Reddit and the fifth most frequent in the interviews (N=11; 55%). Both redditors and participants sought information regarding a beneficiary's reception of other financial support such as insurance or government support. Concerned that the fundraiser might collect more money than he or she actually needed, they also wanted to know the exact coverage of external financial resources and the amount of out-of-pocket money. People asked for more information especially when they had prior knowledge about possible external funding options. For example, many Lyme disease subredditors knew about possible treatments and insurance coverage for the disease and could identify incorrect insurance information in Lyme disease campaign descriptions. Similarly, a redditor asked on a school-based subreddit: "*How does he not have insurance? When I attended, you were required to get medical insurance through the school or had to sign a waiver indicating you had third party insurance. Need more info before I chip in*" (R43).

Off-Site Verification Details

Redditors and our participants all required more detail about a campaign's cause in order to validate the campaign. Requested details pertained to the specific type of medical condition, a detailed description of the accident, or the expected treatments and surgeries. They also questioned the existence of the beneficiary's ailment or the necessity of the treatments listed in the campaign. Some even searched the Internet regarding the medical conditions or the accidents to garner additional information (9 Reddit comments, 7 participants). Reddi-

tors collectively validated the credibility by exchanging supplementary sources via Reddit's commenting feature. When they found information that was inconsistent with a campaign's descriptions, some redditors reported the information as a caution to others. One Reddit discussion started with the question: "*I was going to donate but got totally thrown off by the 50,000 goal. It seems suspicious*" (R17). Other redditors joined the discussion and shared evidence gathered online. Sharing news articles and confirmation letters from crowdfunding sites are notable examples of a collective validation process: "*I contacted the Fundraiser site last night when I was originally concerned and heard from the company. They say they have contacted the actual beneficiaries (the boy's parents) and that it is indeed legit and are working out how to get them the funds and needs. So yay!*" (R153)

Realistic Funding Goals

Both redditors and participants suspected campaigns with an unrealistically high goal that lacked an explanation. A high monetary goal gave the impression that the fundraiser was trying to profit from the situation and negatively affected their credibility. People often asked for a breakdown of how the donation would be spent instead of accepting an arbitrary goal amount for a general cause. Participants also doubted campaigns that had unrealistically low goals for the same reasons: "*\$5,000 is too small [of a] goal amount for cancer. Didn't even describe what they are going to do with this money*" (P15).

Redundancy in Campaign Description, Multimedia, & External Sources

Most of our interview participants (N=17; 85%) validated the campaigns using redundant information reported across the campaign's description, multimedia (i.e., pictures and videos) and external sources (e.g., news articles, Facebook pages, notes from doctors and police). Here, I only refer to multimedia and external sources linked from the campaign page, not the external sources participants and redditors sought out themselves on the Internet. When participants found information about a campaign to be inconsistent with the campaign's description, multimedia, and external sources, they doubted the credibility of the entire campaign. For example, when the beneficiary's estimated age in photos did not match the text description, redditors requested more recent pictures. Our interview participants investigated the campaigns' photographs thoroughly (e.g., to determine whether the faces in every picture appear to be the same person). They also found that the descriptions of some campaigns did not match the publicly reported news article linked on the medical crowdfunding campaign. For example, the fundraiser in Campaign 2 stated the beneficiary

needed \$250,000 for the prescribed treatment while a news article reported that the treatment cost \$225,000. When participants discovered this discrepancy, they suddenly became very skeptical about the campaign.

Beneficiary Merit

A beneficiary's negative reputation or lack of responsibility led both redditors and participants to reconsider the value of the campaign. Both the Reddit comments (N=22; 15%) and our participants (N=3; 15%) questioned the fundraiser's responsibility when they did not have insurance or did not report who was responsible for the accident. Some Reddit comments (N=9; 6%) pointed out the beneficiary's fraud history and/or high income. Redditors sometimes knew about the beneficiary's personal information because subreddits are formed around common interests or places. For example, redditors in a musical band's subreddit knew one band member's scam history and his high income. When this band member initiated a campaign with a high goal amount, redditors suspected his intentions to solicit money via crowdfunding.

Fundraiser and Beneficiary Identity Verification

Redditors and participants verified the beneficiary's and the fundraiser's identity through various means. Participants (N=10, 50%) explained that any social media account linked to names of the beneficiary or the fundraiser added to the credibility of a campaign: "*I think posting videos after you upload [a video to promote the campaign] and you keep using this account [sic] that tells something. If it were fraud, you will probably abandon this account*" (P11). Newly created accounts to promote the campaign received criticism and spawned requests for additional verifying information. To verify the legitimacy of a beneficiary without linked social medial accounts, participants searched for fundraisers' names on the Internet to locate their Facebook, Twitter, or LinkedIn accounts. Warkentin et al. named these real-world identity to online identity links warrants [81] and found that using real-world identities reduces deception in the online environment. Three of our participants stated that they generally perceived LinkedIn information as more credible than Facebook or Twitter information.

The crowdfunding sites I investigated allowed anyone to create a campaign on behalf of a beneficiary. When the fundraiser was not the beneficiary, participants asked why the beneficiary him/herself did not create the campaign or at least contribute in the updates. One participant commented, "*It's only about her aunt. No word from [the beneficiary] herself*

or family” (P11). Many participants (N=11, 55%) also raised questions about the actual relationship between the fundraisers and the beneficiary if the site provided no explanatory information. Redditors wanted to verify whether the collected funds actually went to the beneficiary. For example, they requested a handwritten note from the beneficiary or a Facebook account so that they could contact the beneficiary directly. Further, even if the fundraiser claimed that she or he was the beneficiary, redditors mentioned that some scammers often copied-and-pasted legitimate campaigns: *“The problem I’ve noticed is that there are seemingly legitimate charity-crowd-funding sites that are popping up with seemingly legitimate causes. Then, scammers copyand-paste the charity to their own crowd-funding sites. [] So, buyer (or giver) beware”* (R56).

Others

Uncategorized comments on Reddit included those that flagged a campaign as suspicious without a specific reason. Four participants checked the funding goal completion rate of campaigns (N=4; 20%). Although participants acknowledged that campaigns might have low funding goal completion rates due to multiple reasons, such as poor publicity, they still perceived those campaigns as less credible compared to the ones with higher completion rates. The good reputation of the crowdfunding site such as GiveForward and GoFundMe also played a positive role in a campaign’s perceived credibility. Some participants (N=4; 20%) viewed sites without a lock symbol in the browser’s address or a logo at the top of the page as “sketchy.” They sometimes questioned the site’s campaign screening procedures and performed Internet checks to determine whether the site had a history of scam campaigns. All of the above factors appeared in both the Reddit comment analysis and our interviews. The remaining four credibility factors only emerged in the interviews and referred to communication and emotions.

Communication between Donors and Fundraisers

Participants perceived regular updates as an indicator of the fundraiser’s commitment, responsibility, and appreciation of the donors. Our participants reported campaigns as “highly suspicious” when they had zero to three updates. The inactive campaigns might convey the impression that the fundraiser only coveted donors’ money and had abandoned the project after acquiring it. Participants (N=6; 30%) mentioned that regular updates raised the perceived credibility of a campaign because accumulated updates over time showed the fundraiser’s engagement and commitment to the campaign. Participants especially valued

updates that reported the success of treatment or surgery by virtue of the medical crowd-funding campaign. P10 even commented that he would be willing to give an additional donation if necessary because of one such positive update. Xu et al. similarly found that updates significantly impacted success rates in Kickstarter campaigns [20]. While they did not directly assess credibility, I believe their findings parallel ours and that updates act as a signal of credibility.

Presence of Personal Comments

Participants (N=14; 70%) looked for existing relationships between the donors and the fundraiser through personal comments. The personal comments included mentioning the beneficiary's nickname, describing the beneficiary's personality, or shared experiences with the beneficiary. Such comments reveal the existence of an authentic personal relationship between the donors and the beneficiary. The fact that people who actually know the beneficiary donated money verifies the legitimacy of this campaign. For similar reasons, participants considered donors who provided real names, affiliations, Facebook accounts, or profile pictures as particularly helpful in evaluating the campaign's credibility.

Lower Professionalism Expectations

Three comments on Reddit (2%) identified incorrect grammar in the campaign description as a cause for concern. However in the interviews, incorrect grammar only led to decreased credibility when it appeared careless. Most of our participants tolerated incorrect grammar (N=12; 60%). P1 stated, "*Your level of education and your ability to write has no bearing on the right to your medical care and need for financial assistance. In fact, if you can't write a complete sentence or use correct grammar, you probably have fewer resources and people in your life who have money to give.*" Somewhat surprisingly, some participants (N=4; 20%) even saw unprofessionalism as a sign of credibility. One participant asked, "*If you are so emotional and in a sad situation, how can you have time to make such a good video? [A] high quality video seems sketchy*" (P15).

Appropriate Level of Emotion

Participants (N=9; 45%) reported skepticism of campaigns that displayed excessive or insufficient emotion. They felt that campaigns laden with emotional content signaled a

Table 3.3: Credibility factors contained in our interview campaigns: the dots indicate that a campaign contains the corresponding credibility factor. Campaign 1 (C1) a GiveForward campaign for a baby boy with a rare form of cancer; (C2) a YouCaring campaign for a middle-aged male with a rare form of leukemia; (C3) a GoFundMe campaign for a middle-aged male hurt in car accident while riding a bike; (C4) a GiveForward campaign for a middle-aged female with brittle bone disease hurt in a car accident while driving; (C5) a Fundly campaign for a middle-aged male with a brain tumor; (C6) a GiveForward campaign for a middle-aged female hit by a car while walking.

| Credibility Factors | Campaigns | | | | | |
|--------------------------------------|------------|------------|------------|------------|------------|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Financial Support | • | | • | • | | |
| Off-Site Verification Details | • | | • | | | • |
| Realistic Funding Goal | | | • | | | • |
| Redundancy | | • | • | | | • |
| Beneficiary Merit | | • | • | | • | • |
| Identity Verification | | • | | | | • |
| Communication | • | • | • | | | • |
| Personal Comments | • | | • | | | • |
| Professionalism | | • | • | | | • |
| Appropriate Emotion | | | • | | • | • |
| Average Rating | 3.1 | 4.1 | 4.7 | 2.8 | 1.7 | 4.5 |

disingenuous intent to amplify empathy. Participants wanted to be convinced through rational appeals (i.e., facts) rather than by emotional appeals (i.e. narrative). Using words such as “innocent child” and “best Christmas gift” was deemed as unnecessary, too dramatic, and/or exaggerated by some participants (N=5; 25%). One participant commented that he had seen many scam campaigns that followed “*a template with a sad tone, very emotional [...] It’s mostly about women with kids who don’t have a partner, which is fishy. Her husband left her, she doesn’t have a job and has to take care of a child [Stories about] kids and teens are very common as well.*” Whenever a campaign followed one of these patterns, he found it very suspicious and requested more detailed facts that could ameliorate his doubts.

Conversely, participants perceived lack of emotion as inappropriate for medical crowd-funding campaigns. “*Sounds so weird. ‘Extricated’ is not a word someone would use when they talk about a loved one. It’s a medical or science term. The rest of paragraph is still written as if they are talking about this distant person. It’s very offputting*” (P16).

3.3.2 Summary of Credibility Ratings

As shown in Table 3.3, the three campaigns (2, 3, and 6) that contained the redundancy factor received the highest credibility ratings. Notably, our participants perceived Campaign 3 as most credible (see Table 3.3); it presented a variety of external sources such as a magazine article, news article, and links to pictures on Facebook. The consistent information presented across multiple sources was the most important criteria for evaluating the campaign’s credibility. Campaign 6 was rated as the second most credible. Many updates (10 updates) describing details about the beneficiary’s surgery procedure and her status after the surgery added credibility to this campaign. Campaign 2 was not perceived as credible as Campaigns 3 and 6 due to the uncertainty of how the donation was used. Although the campaign had reached its goal, the beneficiary had passed away before receiving the surgery. Participants wondered what the fundraisers did with the donations.

The other three campaigns (1, 4, and 5) did not have external sources or a sufficient number of updates. Campaign 1 had three updates, but one of the updates contained inconsistent insurance information. Our participants also heavily criticized the fundraiser’s unclear relationship with the beneficiary and the lack of detail when describing the beneficiary’s situation. P13 said, “*Campaign 1 makes me think they are targeting third-party members and I felt they are trying to take advantage of me.*” Campaign 4 and 5 did not have any updates or external sources. Participants particularly marked Campaign 5 as the least credible because the fundraiser provided his personal bank account so that donors could pay him directly instead of using the official crowdfunding website.

3.4 DISCUSSION

Our results suggest that a variety of factors impact the perceived credibility of medical crowdfunding campaigns. In this section, we compare our credibility factors with those previously found in other online platforms including entrepreneur crowdfunding. We highlight three major differences: the presence of personal comments, the appropriate level of emotion, and the lower expectations of professionalism. These communicative/emotional credibility factors were unique to our study, and we explain their connection to the social nature of medical crowdfunding campaigns. Then, we explain the importance of endorsements from the beneficiary’s close-connections. We conclude by suggesting how the community’s collective online presence can be used to increase a campaign’s perceived credibility.

3.4.1 Reasoning, Communicative, and Emotional Factors

Credibility has two key components: trustworthiness and expertise [45]. In contrast to entrepreneur crowdfunding credibility that relies on expertise in making products [82], medical crowdfunding credibility focuses on the *trustworthiness* of the medical situation. Our study identified new communicative/emotional factors as a proxy for verifying the beneficiary’s medical condition. Although numerous entrepreneur crowdfunding studies [83, 27] found that the beneficiary’s social capital (e.g., number of friends on Facebook) relates to the success of a campaign, we additionally identified personal comments as a strong credibility signal of medical crowdfunding campaigns. Personal comments that expressed deeply felt concerns for the beneficiary’s medical condition and/or provided descriptions of shared history with the beneficiary signaled genuine relationships between the donor and the beneficiary. In contrast, entrepreneur crowdfunding donors mainly used the commenting feature to request more information about the product [18], not to have a personal conversation with the beneficiaries. An appropriate level of emotion also played an important role in the positive assessment of a campaign’s credibility because people perceived emotional responses in the context of medical situations to be natural. However, an emotional appeal without any logical reasoning may decrease the perceived credibility.

Some of the credibility factors identified in our study closely relate to factors of online information credibility [47, 84]. Credibility factors for information within websites include 1) author identification and qualification, 2) external links to reputable sites, 3) comprehensiveness, 4) plausibility of information, and 5) professional quality and clear writing. While our study found factors similar to the first four of these credibility factors, our factors emphasize the personal nature of medical crowdfunding: 1) fundraiser and beneficiary identity verification and beneficiary merit, 2) redundancy in campaign description, multimedia, and external resources, 3) details of external financial support and offsite-verification details, and 4) realistic funding goals (refer to Table 2). We found key differences in the fifth factor, professional quality and clear writing. Although non-standard grammar was associated with low credibility in tweets [48], online websites [46] and low success in entrepreneur crowdfunding [19], most of our participants tolerated incorrect grammar (N=12; 60%), often attributing it to the difficulty of the fundraiser’s situation.

3.4.2 Collective Endorsements

Compared to previous organization-based charitable fundraising, crowdfunding puts the burden of establishing credibility on the fundraiser. Organizations could afford third-party

validation [44] or celebrity endorsements [42], but these types of endorsements are difficult to obtain for an individual fundraiser.

Instead, our results show that individual fundraisers can leverage their collective endorsements to signal their credibility. We define collective endorsements as the collection of personal messages from people appearing to be close friends on the public campaign page (whose identities are linked to a social media site) and the online community discussion threads describing that campaign.

As an example, most interview participants (N=18; 90%) pointed out community credibility signals in the campaigns, such as personal comments from the beneficiary’s or fundraiser’s acquaintances, the presence of a fundraising team, and updates acknowledging supporting communities and donors around the beneficiary. Participants interpreted these close-connection endorsements as strong validation of the campaign. P7 stated, “*[the beneficiary’s] friends and coworkers and fellow bikers post[ed] for him on his behalf. When you have people speaking up on your behalf, then [that] definitely adds a lot of weight to the story*” (P7). P16 added, “*just because this is something that other people have looked into, it seems valid.*”

Campaign 3 exemplifies the power of close-connection endorsements. The fundraiser publicly acknowledged supportive communities and donors by name (bicycling community or coworkers) and expressed gratitude. The fundraiser further described how each community helped the beneficiary such as resolving the beneficiary’s insurance problems, advertising the campaign, and organizing meals for those staying with the beneficiary in the hospital. Furthermore, this campaign’s update mentioned an offline meeting between the beneficiary and the donors. The offline meeting presented an opportunity for third-party donors to meet the fundraiser and the beneficiary face-to-face. This also aligns with 6 participants’ common view that donors should not be seen solely as a source of money but rather as a supportive community for the beneficiary.

Similarly, we found that the Reddit credibility discussions provided useful information for other potential donors. When one redditor questioned the credibility of a campaign posted on Reddit, distributed redditors responded and provided evidence found online. Such discussion threads establish a repository of collective validation signals, and potential donors can use this resource to evaluate the campaign’s legitimacy.

Overall, we found that participants perceived campaigns with redundant information across various sites as more credible. The collective endorsement becomes another redundancy signal; the beneficiary’s repeated message endorsements from close connections collectively promote the campaign online. This powerful collective presence distinguishes online medical crowdfunding from traditional charitable fundraising and hints at credibility metrics to come in medical and non-medical domains.

CHAPTER 4: INVISIBLE COLLECTIVE ENDORSEMENTS

In the Chapter 3, I introduced the concept of collective endorsements—a collection of community support collectively endorses the patient’s credibility. However, little is known about who the patient’s supporters are, what support they provide, and why. Therefore, this section investigates a wide range of medical crowdfunding support activities to better understand motivations, benefits, and challenges of providing and receiving support through medical crowdfunding campaigns. This section contributes to the field of online support activities by understanding the experiences of both medical crowdfunding supporters and beneficiaries.

4.1 RESEARCH QUESTIONS

RQ1: Who provides what types of support in the course of medical crowdfunding campaigns and how and why?

RQ2: What are the benefits the beneficiaries and supporters perceive when participating in crowdfunding campaigns?

RQ3: What are the challenges the beneficiaries and supporters perceive when participating in crowdfunding campaigns?

4.2 METHODOLOGY

To answer our research questions, I conducted semi-structured interviews with fifteen participants including three beneficiaries and twelve supporters of medical crowdfunding campaigns.

4.2.1 Participants

To recruit fundraisers and supporters, I first posted flyers in public places and sent emails to local communities. Our inclusion criteria were 1) people who have organized medical fundraising campaigns or have been benefited from campaigns via online crowdfunding platforms or 2) people who have donated to or promoted campaigns to their social networks. To ensure participants participated in online medical fundraising campaigns, I asked them to submit URLs for one or more medical crowdfunding campaigns that they had organized, benefited from, donated to, or promoted via a variety of communication channels. I excluded

people who only participated in personal fundraising campaigns using PayPal accounts, charitable crowdfunding created by organizations, and medical crowdfunding campaigns created for raising funds for pets.

Only two beneficiaries responded to the initial recruitment call. I therefore ran a second round of recruitment. In our second round, I sent a direct message to all fundraisers with an on-going campaigns on the three largest medical crowdfunding sites: GoFundMe, YouCaring, and GiveForward. I further asked our participants to promote the study on their social media sites or by directly contacting any acquaintances who have participated in medical crowdfunding campaigns as a beneficiary or supporter. In total, I recruited three beneficiaries and twelve supporters who had participated in medical crowdfunding campaigns. The campaigns were held on a variety of sites including GoFundMe, GiveForward, YouCaring, and Fundrazr.

Of our fifteen participants, one was male and fourteen were female; with an average age of 32. All three of the beneficiaries created their own campaign as a fundraiser. All twelve supporters had a personal relationship with the beneficiaries of the medical crowdfunding campaigns as shown in Table 4.1; six supporters identified themselves as a close connection. I explain the relationships between the beneficiaries and supporters in more detail in the results section.

Supporters participated in medical crowdfunding campaigns in various ways. They provided support either 1) to help beneficiaries directly to raise money through medical crowdfunding or 2) to address the beneficiaries' needs that could be fulfilled through various communication channels outside of medical crowdfunding. I refer to the supporters who provided medical crowdfunding related support as campaign creation assistants, campaign promoters, and monetary donors. I use the term external supporter to define supporters who provided support outside of the medical crowdfunding. Each support activity is explained in detail in the results section.

4.2.2 Interview Procedure

I invited thirteen local participants to our lab and conducted phone interviews with two participants (B2 and S7) who could not reach the lab. The interviews with three beneficiaries lasted approximately average of one hour and fifteen minutes; Supporters interviews took approximately average of 45 minutes. I compensated each beneficiary and supporter with a \$20 or a \$10 Amazon gift card, respectively. The beneficiaries received more than the supporters because the interviews took longer. Also, I valued the difficulty of revealing sensitive medical and financial information. The semi-structured interview consisted of questions

Table 4.1: Summary of the study participants and medical crowdfunding campaign information that participants have involved in.

| | Campaign Type | | |
|------------|---|--|---|
| B01 | Funeral costs | | |
| B02 | A service dog costs for Type 1 diabetic | | |
| B03 | Medical costs for joint hypermobility syndrome | | |
| | Supporter's role | Relationship with a beneficiary | Campaign Type |
| S01 | Monetary donor External supporter | Close friend | Funeral costs |
| S02 | Monetary donor | Distant friend | Skin cancer |
| S03 | Monetary donor | Distant friend | Skin cancer |
| S04 | Monetary donor Campaign promoter External supporter | Close friend | Stomach cancer |
| S05 | Monetary donor External supporter | Close friend | Colon cancer |
| S06 | Monetary donor | Distant friend | Car accident |
| S07 | Monetary donor Campaign promoter External supporter | Close friend | A service dog costs for Type 1 diabetic |
| S08 | Monetary donor | Distant friend | Skin cancer |
| S09 | Monetary donor | Distant friend | Skin cancer |
| S10 | Monetary donor Campaign promoter External supporter | Close friend | Brain tumor |
| S11 | Monetary donor | Distant Friend | Jaw cancer |
| S12 | External supporter | Close friend | Colon cancer |

identifying types of participation and contribution to the crowdfunding campaigns. I also asked more specific questions of the two groups, as I described below.

Beneficiaries: Beneficiaries were asked why they created medical crowdfunding campaigns and for any concerns and any benefits they had anticipated or experienced during the campaigns. They were also asked to specify who had helped them through the campaign, what types of support they received, and how each type of support impacted them.

Supporters: I first asked supporters to identify their relationship with the beneficiaries of the campaign they participated in. I also asked how they discovered the campaign, why they participated, and how they tried to contribute to the campaign. They were finally asked to summarize the overall experience of medical crowdfunding as a supporter. During the interviews, I showed participants the webpage of the medical crowdfunding campaign they had initially submitted to elicit feedback about their activities. I asked them to feel free to refer to and point to the webpage while answering questions.

4.2.3 Data Analysis

All interviews were recorded and transcribed. Two researchers coded transcribed data using inductive coding [79] using Nvivo [80]. One researcher first highlighted all statements in the interview transcripts that provided explanations for the support activities beneficiaries had received and/or supporters had provided. Another researcher reviewed the highlighted sentences and the two researchers coded them using an inductive process. They iteratively generated and refined themes until they began to see broader patterns in the data. They discussed the codes between each iteration and converged on a set of themes that I discuss next.

4.3 RESULTS

I found that supporters largely engaged in four types of support activities using a variety of online communication channels such as crowdfunding campaign webpages, social media sites, as well as offline interactions. These support activities are composed of monetary contributions and volunteering contributions. The volunteering contributions include assisting in the creation and sharing of campaigns as well as offering external support such as serving meals or organizing local fundraising events. I organize the results around three themes highlighted in our research questions: the types of support activities, the benefits, and the challenges that beneficiaries and supporters perceived.

I define people who gave monetary or volunteering contributions to medical crowdfunding campaigns as supporters. I identified three types of relationships between supporters and beneficiaries in our study: Close supporters include immediate family members, best friends, and girlfriends etc.; distant supporters include friends of the beneficiaries' close connections and acquaintances (e.g., those known from school, work, hobby groups or other organizations); strangers include people who do not know the beneficiaries and are not connected through social media or any other channels. Of our twelve supporter participants six were close supporters and six were distant supporters. In this paper, I use the term supporter participants to refer our twelve participants who supported campaigns and beneficiary participants to refer to the three participants who benefited from campaigns.

4.3.1 Support Activities & Reasons for Support (RQ1)

Although medical crowdfunding campaigns were originally created for financial support, supporter participants offered a variety of volunteering contributions in addition to monetary donations. These include creating a campaign, promoting the campaign, and offering external support. For each support type, I explain who the supporters are, how they provide each support and why.

Assisting in the Creation of Campaigns

The first support type I discovered was creating these campaigns. Medical crowdfunding sites enabled people to easily create a sharable campaign webpage describing their reasons for raising funds and goal amount.

Eight out of twelve supporter participants contributed to a campaign created by the beneficiaries' family member, friend, or student (not the beneficiary him- or herself). Seven supporter participants explained that the beneficiaries' family or friends created the campaigns for one of the two following reasons: 1) In three cases, the beneficiaries could not initiate and manage a campaign because of their personal medical situations; and 2) In four cases, the beneficiaries hesitated to create a campaign because they feared the judgment of their potential supporters.

Although none of our supporter participants were directly involved in assisting in the creation of campaigns, three participants described in detail how others helped create campaigns on behalf of beneficiaries. B1 who had seen other people creating medical crowdfunding campaigns on behalf of beneficiaries explained that, "*the people choosing to set up a campaign are people who already know the person well enough to 'vouch' for them.*" In another case,

S10 had offered to create a crowdfunding campaign when the beneficiary mentioned her dire financial predicament and concerns about creating a campaign. In another example, S4 explained that students who were aware of their teacher's (the beneficiary) difficult medical conditions, voluntarily created a campaign to help the beneficiary "save face" from asking for money for himself: "*They [the beneficiaries] themselves cannot be the ones who ask for money because they want to maintain some sort of integrity. So, the support that they require wasn't just making money with this. It [creating a crowdfunding campaign] was also to help them save face*" (S4).

When creating a campaign, the beneficiary participants explained that writing a fundraising pitch was the most challenging task. They struggled in deciding the appropriate amount of information to reveal and how to frame their needs in a persuasive way. Thus, the beneficiary's family and close friends often helped them by revising the fundraising description. The fundraising description included the beneficiary's medical status (e.g., medical condition, surgery status), reasons for raising money (e.g., uncovered chemotherapy costs by insurance, airplane ticket costs for the beneficiary's family to visit the beneficiary), and their life difficulties (e.g., childcare for the beneficiary's child during surgery, depression brought on by medical conditions).

Promoting Campaigns

The second support type was promoting campaigns. Four supporter participants promoted campaigns on Facebook or via email. Three were close supporters and one was a distant supporter. One beneficiary participant explained that their supporters asking for monetary donations on their behalf signaled that "*they care and they want to help. That really means a lot.*" Campaign promoters publicized campaigns via face-to-face conversations, phone calls, and online communication channels (e.g., instant messaging services, social media sites, and online communities) to better expose the campaigns to a wider audience. When promoters shared the campaign URL on social media sites, they sometimes encouraged their friends to spread the word. Moreover, online communities were often chosen to publicize campaigns to people who share similar medical conditions, hobbies, or organizations with the beneficiaries. Finally, some promoters posted flyers on various public places and wrote hand-written letters to their family and friends who did not have social media accounts.

All of our participants were surprised to see how quickly the number of shares (and donations) increased, only a few days after the social media promotion: "*Almost everyone I know posted about this. So, I think he's probably a really great person and people really care about him and going out of their ways to help him raise funds*" (S3).

Donating Money to Campaigns

The third support type was monetary donations. Eleven supporter participants contributed monetary donations to the campaigns. All but one of our supporter participants found campaigns on Facebook shared from other supporters (one saw a campaign mentioned in a local newspaper). Before donating money, all of them read the donation page to see who contributed money and their donation amounts. Five participants explained that seeing others' monetary contribution records motivated them to donate money. The record of donation also helped them gauge an appropriate contribution amount.

Our participants had a variety of intrinsic or extrinsic motivations for donating money. Five out of six distant supporters donated money after seeing a campaign promoted by their close friends. They described feeling socially responsible when many of their friends had already shared and/or donated to the campaign: “[*I donated because*] he’s my age and some of my good friends are good friends with him and they said all these really good things about him” (S8).

All supporter participants except one who donated money wrote their name when donating to a campaign. They wanted beneficiaries, their friends, and potential viewers to recognize their contribution to the campaign. In some cases, people felt they were representing a group or organization and described wanting the group to be recognized. As S11 said, “[*I wrote my real name because*] I wanted to show my friend that some people in her fraternity supported her.” By donating money, she was also reminding her friend of the larger social group supporting her. Supporters also wanted their monetary donations motivate others to contribute money. Two monetary donors hid their donation amount because they thought it was a small contribution and did not want friends to be disappointed.

Offering External Support

The fourth support type was offering external support. External support refers to support that is not directly mediated through a campaign interface, but addresses the beneficiary’s needs that can be fulfilled outside of medical crowdfunding sites. External support includes 1) offering practical assistance (e.g., helping chores, social visits) and 2) organizing external fundraising events (e.g., venue reservation and snack preparation for the event) to complement the unmet medical crowdfunding funding goal.

Practical assistance: All six supporters who provided external practical assistance were close ties of the beneficiaries. They had offered pet or babysitting, food, an alternative therapy, or hospital visits. The beneficiary participants also had received gifts such as

flowers for a memorial and help with chores. External practical support often occurred when the fundraising descriptions and updates signaled concrete ways to assist. Although medical crowdfunding campaign interfaces do not directly mediate this external practical assistance, the fundraising description provided detailed information about the medical, life, and financial situations of the beneficiary. This description led close supporters to contact the beneficiary privately, via Facebook messages or phone calls, and offer support. For example, one close supporter supplied food to the beneficiary because her fundraising pitch described that she would use the collected funds to buy basic necessities, including food.

Sometimes updates on the campaign site, such as a successful surgery or discharge from the hospital, enabled supporters to plan visits. Even close supporters who already knew about the beneficiary's medical updates found the campaign description and updates helpful to better understand the beneficiary's needs, emotions, and thoughts: *"I guess I knew his issue a little better because obviously when I am with him, I don't want to steer the conversation towards his medical ailment. [...] I guess having the campaign laid out and having everything written out in his words, you know what isn't [an] okay topic to talk about"* (S5).

In general, supporters provided external practical support instead of monetary donations for two reasons. Some lacked the financial resources to donate money. Others believed this external practical assistance had equal, or more value than monetary donations. For example, S12 said she chose to offer free professional pet sitting to the beneficiary instead of a monetary donation because she had been paid to take care of the beneficiary's pet before. She explained that offering free pet sitting was more valuable than a monetary donation because finding a professional pet-sitter like her would be difficult. Five of the close supporter participants offered external practical support in addition to a monetary donation. Their motivation was to help beneficiaries as much as possible. However, they also noted that the visibility of a monetary donation on the campaign interface made them feel obligated and pressured to donate money even though they had already provided external support, which is invisible on the campaign interface.

Supporters who did not provide any external practical support ascribed this to not knowing the beneficiary's needs and/or to their distant relationships with the beneficiary. Even supporters who did provide external practical support explained that they were especially cautious about deciding the kind of support to offer. They wanted to offer the support that beneficiaries really needed and were willing to accept. This is why they initially contacted beneficiaries to ask them about their additional needs: *"I just wouldn't want to over step my boundaries if it wasn't something they [the beneficiaries] weren't comfortable with"* (S4).

All of our supporter participants' external support was accepted by the beneficiaries. Beneficiary participants also appreciated receiving external practical support from their close

supporters as it reduced external expenses. However, B1 described that, at one point, she had to turn away offered food because she already had enough.

Organizing and participating in external fundraising events: Five participants organized or participated in external fundraising events to raise more money to complete the medical crowdfunding goal amount. Close supporters held external fundraising events because they believed donating their time, effort, and talents to organize external fundraising events could result in the collection of a larger amount of money than what they could donate individually. The fundraising events took place at local coffee shops, bars, or restaurants. Close supporters invited potential supporters by distributing posters to nearby businesses as well as creating a Facebook event page. In this manner, distant supporters and strangers made monetary donations through external fundraising.

4.3.2 Benefits (RQ2)

I uncovered benefits that both the beneficiary and supporter participants perceived while participating in support activities.

Benefits for Beneficiaries & Supporters: Perceived Credibility

All of our supporter participants trusted the campaigns they donated to because the campaigns were for beneficiaries they knew or were shared by their close friends. Further, publicly visible donor names and donation amounts on a crowdfunding page made them perceive the campaigns as more credible than fundraising through private methods such as using a PayPal account. Although most donors had concerns about the fees³ that crowdfunding sites take from their donations, they used crowdfunding sites because of their convenience and because their public donations would signal their support.

Benefits for Beneficiaries: Unexpected Support from Distant Supporters and Strangers

All of the three beneficiary and five supporter participants were surprised to see financial and emotional support from distant supporters and strangers. B2 described the pleasure she felt when reading the many encouraging messages left on her Facebook Timeline by people who have similar medical conditions or who have family with similar medical conditions. She even formed a new friendship with some of the strangers while answering their questions about buying a service dog: *"I got to hear so many stories from, like I said, strangers that I had never met. Talking about their nephew who is diabetic and having the same struggles,*

and how inspiring I am. [...] I got to know these people on like a more personal level through this campaign” (B2).

Medical crowdfunding campaigns also resurfaced the beneficiary’s more distant and dormant connections, increasing their social capital. The campaigns enabled our beneficiary participants to re-connect with their distant friends and/or close friends who they had not contacted in a while. For example, one supporter described that she grew closer to her friend again because she contacted the beneficiary via a phone call for the first time in a long time after discovering her medical crowdfunding campaign on Facebook. Since then, they have maintained regular contact. B3 also noted that receiving monetary donations and encouraging messages from her distant friends was one of the greatest benefits that she experienced from medical crowdfunding: *“Maybe one of my Facebook friends shared and then someone else donated that I just knew in high school but I wasn’t Facebook friends with. Then I’ve gotten back in contact with them. It’s kind of nice” (B3).*

The unexpected amount of donations also surprised our three beneficiary participants. B2, a participant with Type 1 diabetes noted that she was surprised to receive a donation from a stranger, a couple who donated \$5000, half of the cost of the diabetes alert dog she needed. She later learned that the donor’s son had died of the same medical condition. The donor invited B2 to a golf outing that the donor’s family organized in their son’s memory. The donor’s family had previously donated all the proceeds to a charitable organization funding Type 1 diabetes research. However, when they discovered B2’s medical crowdfunding campaign via a friend, they decided to donate the proceeds to B2’s campaign. The donor noted that contributing to B2’s campaign made them feel more satisfied because their donation made a more personal and immediate impact on Type 1 diabetes. They wanted to see B2 succeed and continue her life: *“It was an incredibly overwhelming experience, like it’s hard to describe. [...] I would probably say like 20% maybe came from people I didn’t know” (B2).*

Benefits for Beneficiaries & Supporters: Triggering External Support

Some supporter participants who could not afford to donate devised alternative ways to assist beneficiaries. One beneficiary appreciated the supporters’ offerings in place of monetary donations: *“There was a couple people who said, ‘I can’t give money but I’ll make cupcakes for the memorial or if you need a babysitter.’ [...] It seemed like people would still continue to offer things if they couldn’t donate money because a lot of people can’t donate money” (B1).*

Our supporter participants also valued organizing and participating in offline fundraising events. Supporter participants who organized offline fundraising events enjoyed seeing other

supporters around the beneficiaries: *“The fundraiser they had at the coffee shop, the food and drinks to sell and the artists come in and selling their art and crafts things like that to help him raise money. I’ve never would have been that creative and it was so cool to just see all of that. And, it was really an amazing reflection of his friends”* (S6).

4.3.3 Challenges (RQ3)

In this section, I address various challenges that beneficiaries and their supporters faced while participating in medical crowdfunding campaigns.

Challenges for Beneficiaries: Perceived Social Stigma

All of the beneficiary and four supporter participants described the beneficiary’s concern about the possible social stigma of revealing one’s personal medical and financial situation. For example, B1 raised funds for her stepbrother’s funeral costs. Because he died of a drug overdose, her brother’s biological family did not like the campaign, preferring to keep the reason for his death private. While she dealt with the emotional difficulties of losing her brother, she also had to reconcile these conflicting opinions within her family.

All three beneficiaries in our study were concerned that people who saw their campaign might perceive their medical problems as unimportant or as something that the beneficiaries could afford themselves. For example, B2 who has Type 1 diabetes started a campaign to buy a diabetic alert dog that could notify her of changes in her blood sugar levels. The dog cost approximately \$10,000, so although she needed it, she was afraid that others might think the dog was unnecessary. The other two beneficiaries were afraid that people might start to judge the source of their money whenever they traveled, bought clothes, or went to a restaurant: *“It seems like people are scared to ask for help. They’re scared of the judgment of why are you asking for money; or say you post on Facebook that you went to dinner with a friend, they’re worried that somebody’s going to be like, ‘How could you afford dinner but you’re asking for help’”* (B1).

Challenges for Both Beneficiaries & Supporters: Uncertainty about the Potential Impact of Sharing

Beneficiaries faced challenges in estimating their audience’s size and interest on Facebook. They did not know which of their Facebook friends would see their status updates when publishing the campaign. And beneficiaries were concerned whether their supporters would

care enough to click the link and read their campaign: *“I’d put a lot of time into writing out why I thought this was important and why I thought people should donate, but then you share it on Facebook and how many people actually read your statuses, I don’t know”* (B2).

For some family members who kept their family member’s medical condition private, sharing a campaign for the first time on their social network required courage. They were concerned with how their social network would respond to their shared campaign. However, once they shared the campaign on Facebook, they were surprised to see their friends’ willingness to support them. One of our participants explained that he was impressed with his friend who donated money to a campaign even though she was not in a good financial situation: *“He was kind of embarrassed by the whole thing [medical crowdfunding campaign]. He was against the whole sharing and like, “What is it really going to do? People are only going to donate because they feel bad,” but obviously people are very encouraging”* (S5).

Five of six distant supporter participants did not share the campaign on their social media sites, assuming that most of their friends would not be interested in donating to this campaign because they would not know the patient. Alternatively, some perceived sharing the campaign as excessive because many of their social media friends had already publicized it. However, our findings indicate that even distant supporters often donate to a campaign when it is shared many times in their social network.

Challenges for Beneficiaries: Social Cost

Our participants also mentioned the perceived social cost they felt when directly asking for donations or when sharing a campaign multiple times. Perceived social cost is defined as the favor-asker’s perceived value of their friend’s time and effort expending to respond to their favor [85]. For example, although participants wanted to share a campaign several times on Facebook, they were worried about bothering their social network. Instead of directly asking for money, B2 shared updates about her journey to purchase a service dog and mentioned her crowdfunding campaign. B1 explained on social media that she understood that some could not donate and asked them to share her campaign on social media instead. Four out of twelve supporter participants who promoted campaigns signaled their support with endorsements, such as messages expressing how much the patient meant to them. In addition, they explained why the campaign was worthwhile: *“My twin sister posted the link and said like, ‘Oh I’m really proud of Jane for following her dreams. Help her.’ That was nice. It was nice having other people advocate for me because it’s just a little awkward writing down my own campaign”* (B3).

Challenges for Close Supporters: Social Pressure from Expectations

Close supporters struggled with the fact that donations on a crowdfunding page were publicly visible. They stated that this increased social pressure for them to donate money. Close supporters who could not afford to donate felt pressured since they saw their mutual friends' donations on the campaign page. They mentioned that not only the beneficiaries but also other mutual friends would expect a monetary contribution and wonder why they did not donate. Although the patient's close supporters provided external support to the patient (e.g., visiting their hospital), the publicly visible donations made them still feel guilty for not donating money or even for donating less than their mutual friends: *"Seeing everybody donating, you felt kind of pressured into it. [...] It's not only about his brother [the patient] seeing you donate but also other people seeing you"* (S5).

4.4 DISCUSSION

While medical crowdfunding campaigns explicitly requested monetary donations, supporters provided that and more. They contributed by volunteering, such as assisting in the creation of campaigns, promoting campaigns, and supporting externally. The broad range of volunteering contributions occurred because medical crowdfunding beneficiaries felt a sense of social stigma when soliciting monetary donations for themselves from a wider audience. Thus, supporters often created and promoted campaigns on behalf of beneficiaries to maintain their integrity. Supporters also actively participated in promoting campaigns in both online and offline communicative channels in order to reach out to as many potential donors as possible. Such promotional practices enabled supporters to leverage resources (e.g., time, money, and knowledge) to further fulfill the beneficiaries' peripheral needs, which included holding external fundraising events.

Some of our findings resonate with Carpiano's framework describing how social capital and social cohesion influence social support for health [86, 33]. Our results showed that the amount of support beneficiaries can access depends on their social capital (i.e., resources within their social network) and social cohesion (i.e., trust within their social network). Our participants described those who gave the beneficiaries campaign creation, promotion, and external support as a very supportive family and/or as small-town neighbors willing to participate in each other's lives. Moreover, the close supporters' interactions with potential donors impacted the beneficiaries' social capital by expanding supportive social networks. For example, close supporters who promoted the campaign by saying "good things" about the beneficiary encouraged their friends to contribute money even though their friends were

strangers to or distant friends of the beneficiary. In other cases, our beneficiary participants received monetary donations from some acquaintances and strangers, and they even formed friendships with some of them.

Medical crowdfunding campaigns increase beneficiaries' social capital, but could be designed to promote more social capital. For example, social capital increases with reciprocal interaction between individuals [87]. However, interactions between medical crowdfunding beneficiaries and supporters are often asymmetrical on crowdfunding interfaces. While supporters publicly signal individual monetary contributions on the site, some beneficiaries respond primarily with public updates, while others send individual messages. Researching how this asymmetry in communication between beneficiaries and supporters impacts interaction is an area for future work. Designing interfaces to support more reciprocity could help beneficiaries build more social capital.

Some of the support activities identified in our study closely related to entrepreneurial crowdfunding support activities [27]. The two support activities in our finding, creating campaigns and promoting campaigns, correspond to the three support activities in entrepreneurial crowdfunding work – “prepare”, “test”, and “publicize” campaigns [27]. According to Hui et al., entrepreneurial fundraisers obtain professional support from their social network to create a more appealing campaign and publicize the campaign to a wider audience [27]. We found that supporters in medical crowdfunding campaigns helped beneficiaries in a similar way with the goal of maintaining the integrity of the beneficiary. Beyond what Hui et al. identified, our study uncovered that medical crowdfunding supporters voluntarily provided more personal levels of external support such as visiting a beneficiary in the hospital.

Similar to past work in philanthropic crowdfunding [25], our study also showed that voluntary contributions from many supporters highlighted the size and commitment of the beneficiary's social network and signaled the worthiness of their cause [25]. For example, supporter participants sensed that a beneficiary is a “really great person” (S3) worthy of their support when many friends shared a campaign. Such collective evidence of a beneficiary's worthiness of support has been referred to as a collective endorsement [83]. Tanaka and Volda have further shown the importance of “legitimacy work,” that is, the work needed to establish the legitimacy of a philanthropic campaign [28]. However, this legitimacy work has not been emphasized on current crowdfunding platform interfaces. Tanaka and Volda explained lack of support for non-monetary forms of donations in crowdfunding interfaces could decrease the legitimacy of the crowdfunding platform [28]. Beyond decreasing legitimacy, our study also showed that the lack of external support in the medical crowdfunding interface made some of the close supporters feel pressure to give monetary donations even

when they had already provided external support. In the next section, we discuss ways to better recognize volunteering contributions in medical crowdfunding interfaces.

4.4.1 Design Opportunities & Challenges

Despite the variety of volunteering work that supporters could contribute, current medical crowdfunding platform interfaces emphasize only momentary contributions. As a result of this design, two major social issues emerged: (1) the beneficiaries' close supporters expressed social pressure to give monetary contributions and (2) the beneficiary and supporter participants struggled to understand the potential impact of promoting campaigns. To mitigate these challenges, we suggest ways to better recognize external support and campaign promotions on campaign interfaces. However, there are also challenges in deciding what volunteering contribution signals should be made visible [26]. Thus, we also discuss the anticipated challenges and possible future research.

Mediating and Recognizing External Support

Our study showed that medical crowdfunding campaigns' descriptions signaling the needs of beneficiaries led some supporters to give the beneficiaries external support (e.g., serving food, looking after a pet, or planning a local fundraising event). However, one of the beneficiary participants described having to turn away offered food because it had already been taken care of. This finding suggests two possibilities to improve the current medical crowdfunding interface design: 1) scaffolding fundraisers to more explicitly specify the beneficiary's needs that can be supported outside of medical crowdfunding (e.g., offline) and 2) allowing supporters to sign up for the external support opportunities. This interface may serve two benefits for both beneficiaries and supporters. First, because supporters who signed up for external support are visible on the campaign interface, it may mitigate the close supporters' social pressure to donate money via medical crowdfunding if they have already provided external support. Further, supporters can better arrange the external support while avoiding overlapping contributions.

Other types of online health communities such as Lotsa Helping Hands [40] and Caring Bridge [39] function as shared calendars and health journals that allows patients and their family to coordinate help, send health updates and to receive encouraging messages. Previous research has also examined how the families collaboratively cared for patients by listing their needs on a Facebook page [8] or by sharing a paper-based or digital calendar [88]. Similar to these online care calendars and message boards, medical crowdfunding campaigns

could integrate external support activities to better acknowledge the supporter’s external contributions.

However, the decision of what features to make visible and invisible is fraught with design challenges [57]. A fundamental concern deals with the funding models of existing medical crowdfunding systems. As previously discussed, these sites are funded from fees for all donations. Thus, while crowdfunding sites are interested in encouraging a large number of visitors and encouraging trust, they may not want to host long-term users, as such users add resource costs without making further monetary donations. We propose medical crowdfunding fundraisers incorporate links to volunteering-focused sites while making this other external support more visible.

Despite this possible issue, GiveForward, one of the biggest medical crowdfunding sites, recently started integrating external support with their “Give a Meal” and “Wishlist” features. Future studies should investigate how supporters use such integrated features and how they impact both monetary donations and volunteering contributions in crowdfunding campaigns.

Highlighting the Impact of Campaign Promotion

We suggest design opportunities to help patients better understand their audience and the benefits of promoting their campaigns.

Visualizing campaign promotion networks: In line with the previous research about the invisible audience [89], our participants had difficulty understanding their audience. Our beneficiary participants discussed how they wish they knew their audience size and interest, to better target the writing on their medical crowdfunding campaign page. For fundraisers who have a significant number of campaign promotions, showing them a network of who had shared their campaign and to whom they shared it, might help them understand this. It may also help fundraisers target the right social media channels for promotion. A visualization analogous to Google+’s Ripple highlighting information flow [64] could be adapted to visualize these sharing networks.

There are a number of risks associated with such a visualization, however. If few people share the medical crowdfunding campaign, beneficiaries and their close supporters might be discouraged. As beneficiaries receive collected funds regardless of whether they reach their fundraising goal, it might be preferable to provide users with a plausible deniability where they are uncertain who has seen or shared a campaign. And as potential supporters might not see all shared campaigns (particularly on filtered feeds like Facebook [90]), beneficiaries might be offended by incorrectly believing someone had seen their campaign but chosen

not to support or contact them. Considering the possible issues, future research should investigate ways to visualize the networks of campaign promoters to help beneficiaries better understand their audience.

Emphasizing the value of campaign promotions: Another finding of our work was that supporters typically undervalue sharing activities, feeling that only donations are valued (as they are the focus of current interfaces) and expressing guilt if they could not donate or felt they had donated too little. Thus, supporters might also benefit from better visualizations of the value of sharing. For example, prompts for sharing could include the average value of a share (e.g. “Your share is worth \$5 on average!”) or even more personalized information; a logged-in supporter might be shown the total amount all the friends they shared with have donated to the campaign or the number of times those friends have shared it.

However, while this might motivate supporters to share more, that is not necessarily preferable. For example, many beneficiary participants expressed concerns about their medical information being shared with others. Gamifying the donation sites or encouraging indiscriminate sharing might therefore have negative repercussions for beneficiaries. While medical crowdfunding websites wish to gather more donations, this goal must be balanced against the privacy needs of the beneficiaries. Thus, decisions of what signals of campaign promotions should be made visible must be thoroughly considered.

CHAPTER 5: STORYTELLING WITH COLLECTIVE ENDORSEMENTS

In the Chapter 3 and 4, I showed that publicly presented information about medical crowdfunding beneficiaries on campaigns impacted the credibility of the beneficiary and the types of support contributors offer. Thus, presenting the beneficiary's identity in an appropriate manner is critical to elicit a variety of support from contributors. Chapter 5 and 6 contribute to the field of social identity by investigating what strategies medical crowdfunding beneficiaries use to present their identity on crowdfunding campaigns and how their contributors perceive them.

5.1 RESEARCH QUESTION

RQ1a: How do beneficiaries currently choose what information to highlight in their medical crowdfunding campaigns and why?

RQ1b: How do contributors perceive the information presented on medical crowdfunding campaigns?

RQ2a: How do beneficiaries and contributors prefer to display contributors and contributions using the contribution features on medical crowdfunding campaigns and why?

RQ2b: How do beneficiaries and contributors perceive the contribution features displayed on medical crowdfunding campaigns?

5.2 METHODOLOGY

5.2.1 Study Procedure

The interviews consisted of two sessions: a self-reflection session and an interface design session. 14 participants were interviewed via Skype and Google Hangouts. One local participant came to our lab for the interview. The interviews with beneficiaries lasted approximately ninety minutes; the duration of the contributor interviews was approximately fifty-five minutes. A \$30 or \$20 gift card was offered to each beneficiary and contributor participant, respectively. I compensated beneficiaries more than contributors because it was more challenging to recruit them and because of the sensitive nature of the medical and financial information they were sharing.

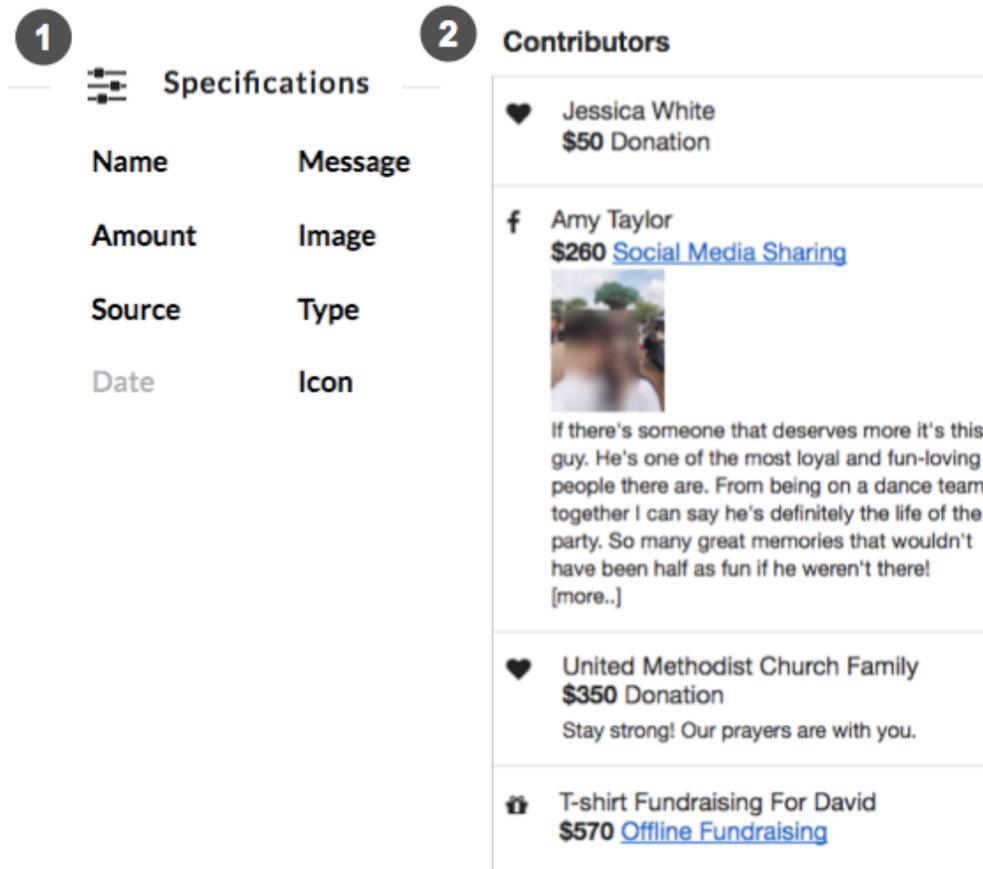


Figure 5.1: A webpage for customizing a medical crowdfunding interface by modifying contribution features: Using the specifications menu bar (1), users can toggle each contribution feature that appears on the customizable interface (2).

The Self-Reflection Session

During the self-reflection session, I showed participants their medical crowdfunding campaign webpages to remind them about the information presented in the campaign. For remote participants, I asked them to share a screen that displayed their medical crowdfunding campaign page. Remote screen sharing features in both Skype and Hangouts allowed us to view the same webpage with participants. With our beneficiary participants, I explored their existing methods of presenting information on their medical crowdfunding campaign. I first asked about the most important impression that they wanted to convey about themselves. I then asked how they tried to signal this impression on their medical crowdfunding campaign. I further asked about the challenges they encountered in conveying this desired impression.

The Interface Design Session

We provided beneficiary and contributor participants with a new webpage that allowed them to customize a medical crowdfunding campaign by modifying the contribution features introduced in the previous section (Figure 5.1). The contribution features included contributor names, contribution amounts as a monetary value, links to the contribution sources (e.g., source site such as Facebook), contribution dates, contribution details (messages and images), and contribution types (e.g., financial donation, social media sharing, and offline contributions). The contribution types can also be displayed in the form of an icon. We additionally included the icon feature to increase the legibility of the contribution types. Using the specifications menu bar shown on the left side of the webpage (Figure 5.1-1), participants can toggle each feature on the customizable interface (Figure 5.1-2). The design of the interface (Figure 5.1-2) resembled a contribution interface on an existing medical crowdfunding campaign. By toggling the features, participants could experience what the interface would look like with the additional features. Unlike the existing contribution interface, our customizable interface displayed both monetary and non-monetary contributions. Through the interface design session, we aimed to understand 1) what kind of contribution features both beneficiaries and contributors preferred to display and 2) what inferences they made from their chosen contribution features, and 3) the potential impact of presenting non-monetary contributions on medical crowdfunding interfaces.

We collected participants contribution data before each interview so we could display it on the customizable interface. Collecting non-monetary contributions required additional effort because they were not publicly visible on crowdfunding campaigns. Non-monetary contributions consist of campaign promotions and offline contributions [17]. To gather campaign promotion data, we searched for and collected posts containing the beneficiary's campaign URL on various social media sites such as Facebook, Twitter, and Instagram. We also did a Google search for the campaign URL to collect publicly available news articles and online community promotions about the beneficiary's medical crowdfunding campaign. In addition, we asked beneficiaries to add any types of contributions that occurred offline themselves. Examples of manually added contributions included renting a car, babysitting, renting an apartment, and housecleaning.

During the design session, we asked beneficiary participants to design their own interface using the customizable interface (Figure 5.1). We then asked beneficiary participants why they chose to show and hide each feature. And conversely, to investigate how contributor participants perceive the contribution features displayed on the beneficiary's interface, we also asked contributor participants to design the beneficiary's interface. We then asked contributor

participants what inferences they made from each feature displayed on the interface.

5.2.2 Data Analysis

All interviews were recorded and transcribed. To analyze the transcribed data, we used Nvivo [80] and conducted inductive coding [79].

To answer RQ1, we began by coding the information that our beneficiary participants highlighted in their medical crowdfunding campaign, their reason for emphasizing the information, and the way they presented the information. From the contributors interview data, we coded the inferences that our contributor participants made from the information presented on medical crowdfunding campaigns. Two researchers grouped the information and the inferences based on common themes until they reached consensus. We repeated this analysis process for the second research question.

To answer RQ2, we identified common contribution features that both beneficiary and contributor participants preferred to display or hide on a medical crowdfunding campaign. For each contribution feature, we coded 1) the inferences that participants made and 2) the reason that participants desired to display or hide them. We then categorized the interface features based on common inferences and the reasons behind them. In the next session, we present our final grouped categories.

5.3 RESULTS: SELF-PRESENTATION

In this section, I describe how beneficiary participants desired to present their strong identity using pictures of their positive moments. At the same time, beneficiary participants felt obligated to present their sick identity that they believed their contributors want to see (RQ1a). In contrast to the beneficiaries' expectations, our contributor participants perceived positive pictures as more impactful than pictures depicting dire conditions because the positive images helped them infer the beneficiary's character and common connections to the beneficiary (RQ1b).

5.3.1 Pictures of Beneficiaries: Capturing Positive Moments vs. Presenting Dire Conditions

Beneficiary participants chose happy and good-looking pictures of themselves to break stereotypes associated with their medical conditions. For example, B2, who raised money for her brother who died of a drug overdose, selected a profile picture of her brother with

a neat and tidy appearance. She did not want people to consider him a street person. The other beneficiary participant, who experienced human trafficking, chose a smiling picture of herself because she did not want to be seen as a victim, but rather as a brave survivor of abuse.

Beneficiary participants did not want to be seen as the pitiful or needy person often depicted in charity solicitation letters. Instead, they wanted to be presented as a person like everyone else and who can overcome their difficulties with the help of others: I wanted people to see that he [my brother] is just like everybody else. When you think of someone who dies of an overdose, [...] we try to imagine the person as someone as far away from us, [...] nothing like our brother or sister. They're like a street person or in alleys or dirty. You know he was not. He was handsome and clean and took pride in his appearance. So I wanted to show people that you don't have to look a certain way. - B2

Beneficiary participants conveyed authenticity and seriousness through pictures depicting the beneficiary's medical conditions (e.g., pictures taken in the hospital bed or tumor pictures). Although all of our beneficiary participants believed in the importance of sharing medical condition pictures, some of them faced challenges. For example, B1 could not post these pictures because her conditions (losing her eyesight and having a dental issue) were invisible. She also could not share her medical paperwork because she did not see her doctor before she created her campaign. Similarly, B5 who was raising funds for her friend decided not to share pictures illustrating her friend's suffering since she would pass away soon: *If you know they [beneficiaries] were getting better, I feel more comfortable with that [sharing pictures of her ill]. But because I knew what Melinda1's inevitable end was, I felt this is the way people would want to remember [her].*

Despite the challenges the beneficiary participants faced sharing pictures of their dire medical conditions, some of them still felt guilty about not sharing such pictures. They worried that contributors might perceive that their need is not great enough to deserve financial contributions: *"People don't know this [dyed] hair thing is all free because it usually takes \$600 with my length of hair. They don't know this is the present from other people. That little bit makes me feel insecure. I feel already guilty about [asking for money]."* B1

While beneficiary participants often felt obligated to present their medical conditions in a serious manner, contributor participants gave less attention to the pictures illustrating dire medical conditions.

Rather, they focused on the beneficiary's character. Contributor participants inferred a bright and positive personality from pictures of a smiling beneficiary. Pictures taken with friends and family, especially in volunteering activities, conveyed the beneficiary's social and giving characteristics. The contradiction between a picture capturing the beneficiary's

silver lining moment and a fundraising description depicting dire medical situations provoked contributors' emotional responses. Because some of the contributor participants could relate to beneficiaries when they were looking at the pictures from the beneficiary's normal life, they felt more empathy when they read the beneficiary's medical story: *"When you emphasize the depth of the situation and the neediness, that definitely makes it real. But, it doesn't necessarily make someone want to contribute. To be honest, there are many people in needy situations. But if you don't have a personal connection to [them], you're kind of trained to just look past it. I think it's important to emphasize how good his character is because it makes him seem more deserving."* - C7

5.3.2 Detailed Medical and Financial Situations in a Campaign Description

Beneficiary participants wanted to signal their honesty and courage by describing their financial and medical situations in detail in the campaign description. Because they were asking for financial contributions for their personal medical situations, half of the beneficiary participants worried that audiences might perceive them as lazy, cheating, or as taking advantage of people. It took courage to share their sensitive and traumatic experiences, such as how a participant lost her sight because of severe abuse and how much a family was unprepared to lose a brother from a drug overdose. Although some of the beneficiaries' family members were opposed to sharing details, beneficiary participants felt that to be deserving of a contribution they must share: You kind of don't overcome that concern [being guilty about asking for money]. It still exists. The only thing you can [do to] compensate that is to be honest and let people know everything that's happening. [Then,] maybe people who thought I was cheating in the beginning will read more updates, details, and pictures. B1

Beneficiary participants expressed their gratitude to contributors by updating their medical progress on their campaign pages. Most of our beneficiary participants had approximately 7 to 12 updates (at most 108 updates). They updated their detailed medical journey, which included information about how hard they searched for the cheapest surgery, their pre- and post-surgery progress, and up-to-date reports on their medical expenditures. From the steady updates, contributor participants inferred the beneficiary's diligence and gratitude to contributors: *"It's really great to feel invested and connected by getting those updates and see how she's able to get things done and I was able to help facilitate that with my donation."* - C2

Table 5.1: Contribution features and inferences perceived by beneficiary and contributor participants.

| Contribution Features | Inferences | |
|------------------------------|---|----------------------------|
| | Beneficiaries | Contributors |
| Contributor names | Past and current relationships | Common connections |
| Contribution details | Memories with contributors | Beneficiary’s character |
| Contribution dates | Medical journey | Activeness of the campaign |
| Contribution types | Sincere community support | |
| Contribution sources | Opportunities for interacting with other contributors | |
| Contribution amounts | Characteristics about contributors (e.g., stingy or generous personality) | |

5.4 RESULTS: CONTRIBUTORS & CONTRIBUTIONS

In this section, I describe how our beneficiary and contributor participants preferred to highlight all the contribution features on their campaign webpage except for the contribution amount (RQ2a). The reasons given for displaying contribution features were that they: 1) assisted contributor participants infer the beneficiary’s character, common connections, and sincere community support around the beneficiary and 2) helped beneficiary participants view themselves as beloved members of a community by telling stories about how each contributor evolved in their medical journey (RQ2b; see Table 5.1).

This storytelling is done by discovering: where the beneficiary’s contributors come from (contributor names), why the contributors support the beneficiary (contribution details), where in the beneficiary’s medical journey each contributor belongs (contribution dates), and how much the beneficiary matters to each contributor (contribution types and sources).

5.4.1 Contributor Names Signaling Common Connections

Contributor names allowed beneficiary participants to tell stories about how various people from different parts of the beneficiary’s life came together to support the beneficiary. For

example, beneficiary participants felt very supported when they saw the names of their close friends, old friends, distant friends, and even strangers with a similar medical situation in one place. Beneficiary participants displayed contributor names so that other mutual friends could recognize their friend's names and feel as if there were a community: *"I know Kevin, and I know Mary and they know each other. Even though Kevin lives in Georgia and Mary lives in California. They are able to see that they are both partnering with us. Because they knew each other back in college and now we are in [a] totally different situation, they are still part of the story."* - B4

As beneficiary participants expected, contributor participants looked for the names of their friends on the contribution interface. Contributor participants, even people who were not close to the beneficiary, felt more connected to the beneficiary when they saw the names of mutual friends. Contributor participants also discovered common connections between the beneficiary and organization contributors (e.g., a church). For example, the name of a dance club, a church, or a fraternity signaled the beneficiary's hobbies or religion that contributors often did not know about.

5.4.2 Contribution Details (Messages and Pictures) Conveying the Beneficiaries' Characters

Beneficiary participants preferred to emphasize the contributors' messages because they evoked fond memories. Especially relevant were the messages posted on contributors' social media pages because they often contained very detailed shared experiences between the beneficiary and contributors. For example, a contributor described how often she cried on the beneficiary's shoulder when she was going through a rough time. Other contributors also mentioned the beneficiary's personal characteristics such as He's one of the most loyal and fun-loving people. Beneficiary participants thought such messages would do a better job of showcasing their character. For example, beneficiary participants felt that descriptions of the beneficiary written by contributors were more trustworthy than those written by the beneficiaries themselves: *"What other people said can be more trusted. Because there are so many things that you don't know about yourself, but other people know about you."*

Contributor participants enjoyed reading messages and seeing pictures from fellow contributors. These messages and pictures represented the beneficiary's character because they showed why fellow contributors were supporting the beneficiary and promoting the campaign to their friends on social media. For example, contributors often wrote long and personal messages to explain how beneficiaries touched many different people's lives in different ways. Especially meaningful were pictures shared by contributors, which visually represented the

beneficiary's character and personality remembered by contributors: *"It [images from contributors] just shows that he's a guy who really cared about his family and friends, always smiling, [a] happy-go-lucky kind of person. This further solidifies everything that some of my friends said about him, being a nice guy."* - C6

5.4.3 Contribution Types, Sources, and Dates Signaling Medical Story

Beneficiary participants preferred to display various types of contributions with the exact dates of contributions. They wanted to show that different types of contributions were equally valuable and precious in every step of their medical journey. For example, by seeing many donations, social media shares, and offline contributions received in one particular day, beneficiary participants could tell a story about how these contributions supported them when they had surgery or when a beneficiary's son passed away: *"Seeing the contributions and sharing that has been made to keep us going. It's been a comfort. It's like a blanket. These are the people who have been a part of the fabric of the thing that has held me together."* - B3

Instead of focusing on financial contributors, beneficiary participants desired to recognize how each contributor contributed to specific stages of their medical journey. They believed that this kind of contribution interface, emphasizing story, could lessen guilt for people who could not afford to donate money: *"**People can feel a part of a story.** They may not be able to contribute very much financially, but they can still feel like they can be part of it. They can always share it [a campaign] and say, 'Here [is] how I was part of the GoFundMe page. Even though I wasn't able to give financially, here's a way I was participating.' I can see how that would take the pressure off on the financial piece."* - B4

Contributor participants preferred to see the latest contributions first in the contribution interface because they could infer the level of activity of the beneficiary's campaign from the most recent contributions. I also found that contributor participants enjoyed seeing various types of contributions, as shown in Kim et al. [17]. Various types of contributions signaled the beneficiary's importance to each contributor. For example, some contributors lent their car for two months to the beneficiary; other contributors organized an online t-shirt-selling fundraiser. These creative external contributions triggered other potential contributors' participation. Further, showing the contribution sources (e.g., links to contributors' social media account) made contributor participants want to interact with other contributors by leaving comments on social media campaign shares or being friends with fellow contributors: *"I immediately found like three people that supported somebody that's really important to me. I didn't know they supported it in a big way. It makes me reach out and thank them. I might*

want to make friends with some of these people or follow them.” - C1

5.4.4 Contribution Amount as a Signal of Contributors’ Characteristics

Contribution amount allowed both beneficiary and contributor participants to infer aspects of contributors’ personalities: generosity, stinginess, and boastfulness. Half of both beneficiary and contributor participants did not want to show contribution amounts from individual contributors because it resulted in judgments made about the contributors based on the amount they donated.

Small Amount a Generous or Stingy Personality

Beneficiary participants often inferred the generosity of contributors from five- or ten-dollar contributions if they were aware that the contributor had a difficult financial situation. At the same time, beneficiary participants worried about these contributors; they did not want the contributors to feel embarrassed about their donation amount. On the other hand, contributor participants often believed that fellow contributors who made a small contribution had a stingy personality. Knowing other contributors’ incomes or profligate spending habits sometimes made contributor participants judge other contributors: *“It [contribution amount] has further relationship implications. People are taking what they see here and layering that with what they know of you in another way. [...] ‘Oh, I know you spent \$100 a week on your nails and you only gave \$5 to this person.’” - C4*

Large Amount a Generous or Boastful Personality

Large donations often signal generosity [91]. However, some of our contributor participants interpreted a large donation amount as a form of bragging. For example, one participant judged the motivation of a contributor who donated twice as much as other fellow co-workers negatively. She said, *“I think there are people that are driven by just wanting to [one-] up the other person. [...] Just knowing this person, they’re one of those people that always have to one-up everybody else. They always have to go on the better vacation. They always have to mention the name brands of their belongings.”* Beneficiary participants further worried that some people might donate less than what they had originally planned just because their other friends donated a small amount.

5.5 DISCUSSION

Our results suggest two main factors that make self- presentation in medical crowdfunding unique from other social media and online communities: 1) social expectations about people who seek and provide financial support and 2) the misalignment between what the beneficiary participants believe contributors want to see and what contributors prefer to see. In this section, I discuss how these two factors contribute to unique self-presentation practices performed on medical crowdfunding and how these practices suggest novel design opportunities for medical crowdfunding campaigns.

5.5.1 Unique Self-presentation in Medical Crowdfunding

As people who interact with others online are interested in self-presentation [92, 93], patients who share their health situations on social media often desire to portray themselves as positive and strong [4]. However, our beneficiary participants felt obligated to present themselves as in need. They worried that happy looking profile pictures might lead people to perceive that they are not in a desperate enough situation to deserve financial support.

Thus, to convey the image that contributors might expect, some beneficiary participants felt obligated to describe their potentially sensitive medical situations (e.g., human- trafficking, drug overdose) in campaign descriptions, even against the objection from their family members. Despite the beneficiary participants' perceived expectation of contributors, our study suggests that contributor participants were more intrigued by the beneficiary's character and mutual connections than the detailed description of medical situations. While Kim et al. found that the detailed medical situation presented on medical crowdfunding campaigns was critical to assess the trustworthiness of beneficiaries [28], I discovered that the beneficiary's character and contributors' sense of connection with the beneficiary was more important when deciding whether to make an actionable donation. Our contributor participants inferred the beneficiary's character, common connections, and sincere community support from contribution features. However, publicly displayed monetary contribution amounts resulted in judgmental attitudes regarding the contributors. This negative inference about contribution amount is unique to medical crowdfunding because contribution amounts in other online communities often signal the contributor's level of commitment [55, 94, 71]. In medical crowdfunding, however, publicly visible financial contribution amounts make contributors judge the amount based on their prior knowledge of those contributors (e.g., profligate spending or braggadocio personality). In the next section, I suggest designing a medical crowdfunding interface that goes beyond presenting individual contribution amounts

to emphasizing positive aspects of contribution features.

5.5.2 Design Opportunity: A Storytelling Interface

Our results (see Table 5.1) suggest that the contribution features together could support storytelling about the beneficiary’s standing in their community. This type of storytelling influences how a patient constructs self-identity [95]. Medical crowdfunding beneficiaries often experience an identity shift from a sick person to a more open person as they publicly write about their medical needs in a crowdfunding campaign [96]. Our work further found that beneficiaries come to view themselves as a loved and well-appreciated person when they see contributors and contributions from their community. In this section, I describe possible ways of designing a medical crowdfunding interface to better assist storytelling. I further discuss prospective benefits of the storytelling interface for both beneficiaries and contributors.

Storytelling for Medical Journeys

Showing the exact date of each contribution (see Figure 5.1) allowed our beneficiary participants to tell a story by connecting contributions to the most recent medical incidents (e.g., surgery). However, viewers who don’t remember the exact dates of medical incidents might not be able to make this association. One way to highlight this association is to connect the contribution interface with campaign updates. Beneficiaries already describe their medical journey by posting updates within the campaign. Categorizing the contributions into groups based on the dates and connecting each group to the nearest updates can further support the storytelling. Understanding how their contribution is connected to a stage of the beneficiary’s medical journey may give contributors a sense of belonging to a specific campaign community and story. Furthermore, this storytelling interface might better help beneficiaries experience a shift in their identity from an ailing to a beloved member of a community.

Suggesting More Personalized Messages for Sharing

The storytelling interface can assist people in writing more specific and personal messages when promoting campaigns. Campaign promotions are critical to a crowdfunding campaign [83, 17, 30]. However, audiences are likely to ignore the shared messages if they are automatically generated [97]. While showing contributors’ support associated with specific medical

updates, the system can guide contributors to write more personal and specific messages about why and how they are supporting a beneficiary.

Highlighting Common Connections

A study on Facebook found that people who shared more information about themselves, such as hobbies and the schools they attended, had a higher number of friends as they established more common referents [98]. Our contributor participants were also more willing to make a contribution when they discovered common referents such as a mutual friend and a common organization. To help more medical crowdfunding contributors establish common referents, medical crowdfunding platforms can suggest that campaign creators specify the beneficiary's community attributes such as school, hobbies, and hometown in the campaign description. The platforms can further scaffold medical crowdfunding contributors to describe their relationship with the beneficiary, common organizations, or personal experiences when making their contributions. By grouping the contributors based on common referents, medical crowdfunding contributors might feel more involved in a community and learn more about the personal side of their beneficiary. Beneficiaries can also learn more about their contributors.

Non-monetary Contributions for Story Richness & Legitimacy

Incorporating non-monetary contributions into a medical crowdfunding interface could add richness to the story and add to the legitimacy of a campaign [98, 25]. For example, when one of our beneficiary participants wrote an update about a trip for her son's surgery, respondents offered to loan their cars or to find people who would rent out their residences. Beneficiary participants told richer stories with various non-monetary contributions because they could reflect how different types of contributions supported their lives together. Non-monetary contributions further signal the legitimacy of a campaign because they show how much the beneficiary is appreciated by contributors [25]. Particularly, contributors' messages that endorse the beneficiary's personality and describe the beneficiary's impact on their lives can increase the beneficiary's trustworthiness. People trust information generated by others more than self-generated information [99].

5.5.3 Design Decisions stemming from Privacy & Ethics

This section describes ethical design considerations we need to make when presenting previously invisible non-monetary contributions on medical crowdfunding campaigns. The design decisions stem from privacy and ethical issues related to social and medical challenges beneficiaries and contributors might encounter.

First, designers should consider privacy issues that contributors might face when incorporating social media shares and offline contributions (e.g., holding an offline fundraising event or serving food); perhaps contributors should control what to display for their contribution. However, it is also important to give beneficiaries the capability to add and remove the non-monetary contributions to resolve potential problems. For example, one of our beneficiary participants received negative comments on her medical crowdfunding campaign from her family members who were opposed to creating a campaign. Beneficiaries should be able to remove the contributions that they believe may negatively influence how they are perceived.

Second, contributors should continue to have an option to display their support anonymously. Medical crowdfunding contributors sometimes prefer to hide their name, to be discreet. Thus, the system should support existing practice.

Third, designers need to consider ways to minimize additional work produced by including non-monetary contributions. For example, if beneficiaries spend too much time and energy managing the presentation of their non-monetary contributions, their well-being, given their health concerns, might be affected negatively.

Finally, the medical crowdfunding interface incorporating non-monetary contributions might not be effective for beneficiaries who have few non-monetary contributors. They might feel more discouraged about having fewer contributors than other beneficiaries. We need to find better ways to support those beneficiaries who may lack friends or family to provide non-monetary contributions.

CHAPTER 6: DESIGNING SOCIAL TRANSLUCENCE INTO COLLECTIVE ENDORSEMENTS

The Chapter 5 showed that simply presenting medical crowdfunding non-monetary contributions in a table view on a crowdfunding webpage can motivate people to contribute. However, simply presenting all the available data without processing can hinder the viewers from obtaining meaningful insights or result in a breach of privacy for contributors [58, 67, 54]. Therefore, Erickson & Kellog introduced the social translucence framework to balance the benefits and the dangers of social transparency [54]. They argue that making fellow contributors' behaviors *visible* in abstract representations can facilitate *awareness* of other contributors without breaching privacy, and thus make contributors *accountable* for their actions. This section contributes to the social translucence framework by investigating the role of social translucence in medical crowdfunding. The goal of this chapter is twofold. First, I investigate possible ways to make non-monetary contributions visible on medical crowdfunding campaigns. Second, I aim to understand possible benefits and challenges of recognizing non-monetary contributions.

6.1 RESEARCH QUESTION

RQ: What inferences do medical crowdfunding beneficiaries and contributors make from interactive visualizations highlighting the impact of non-monetary contributions on their medical crowdfunding webpage?

6.2 METHODOLOGY

To answer our research question, we developed three different types of functional visualization prototypes that make non-monetary contributions residing outside of campaigns visible on participants' medical crowdfunding campaigns (Figure 1). In this section, we present our rationale for choosing each visualization style as well as procedures for participant recruitment, our study, and data analysis.

6.2.1 Rationale for Choosing Visualizations

We chose three visualizations based on prior medical crowdfunding research that uncovered the difficulties patients and contributors faced due to the invisibility of outside non-monetary contributions [28, 17]. The challenges included not being able to know 1) the

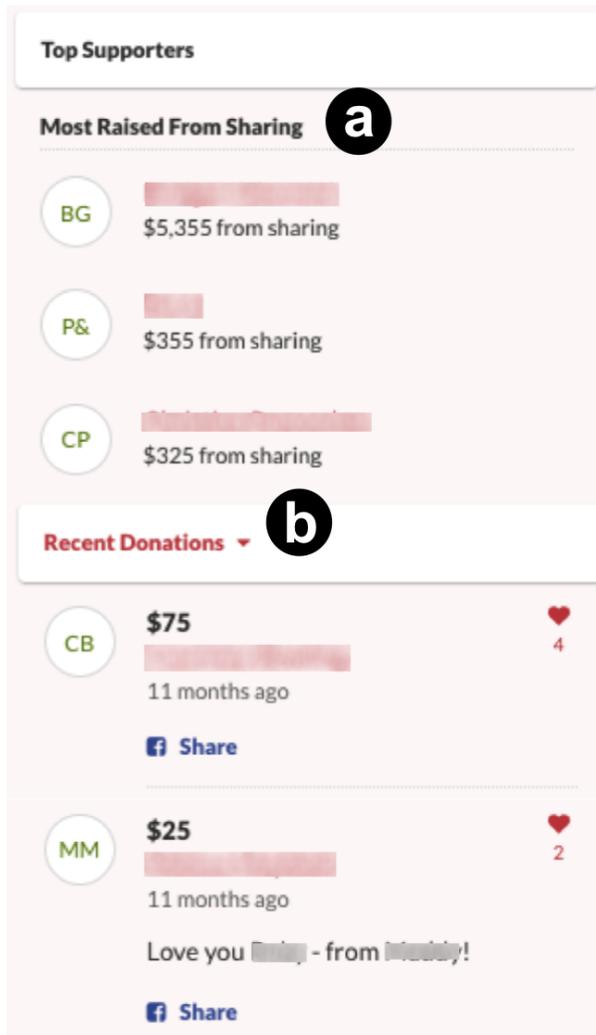


Figure 6.1: GoFundMe contribution interface: (a) GoFundMe displays the names of the top five campaign sharers and the amount that they have raised from sharing. (b) Every monetary contributor's name, contribution date, amount, message are displayed in reverse chronological order.

Contributors

♥ Jane Smith
\$150 Donation
Jul 8, 2016

f David Hardy
\$260 [Social Media Sharing](#)
May 4, 2016



If there's someone that deserves more it's this guy. He's one of the most loyal and fun-loving people there are. From being on a dance team together I can say he's definitely the life of the party. So many great memories that wouldn't have been half as fun if he weren't there! [more..]

♥ United Methodist Church Family
\$350 Donation
Apr 13, 2016
Stay strong! Our prayers are with you.

📁 T-shirt Fundraising For David
\$570 [Offline Fundraising](#)
Mar 20, 2016

♥ Anonymous
\$20 Donation
Mar 13, 2016

Figure 6.2: Table View: In each row of the table, each contributor's name, message, contribution amount, type, date are presented. (All the names and pictures used in the interface are anonymized.)

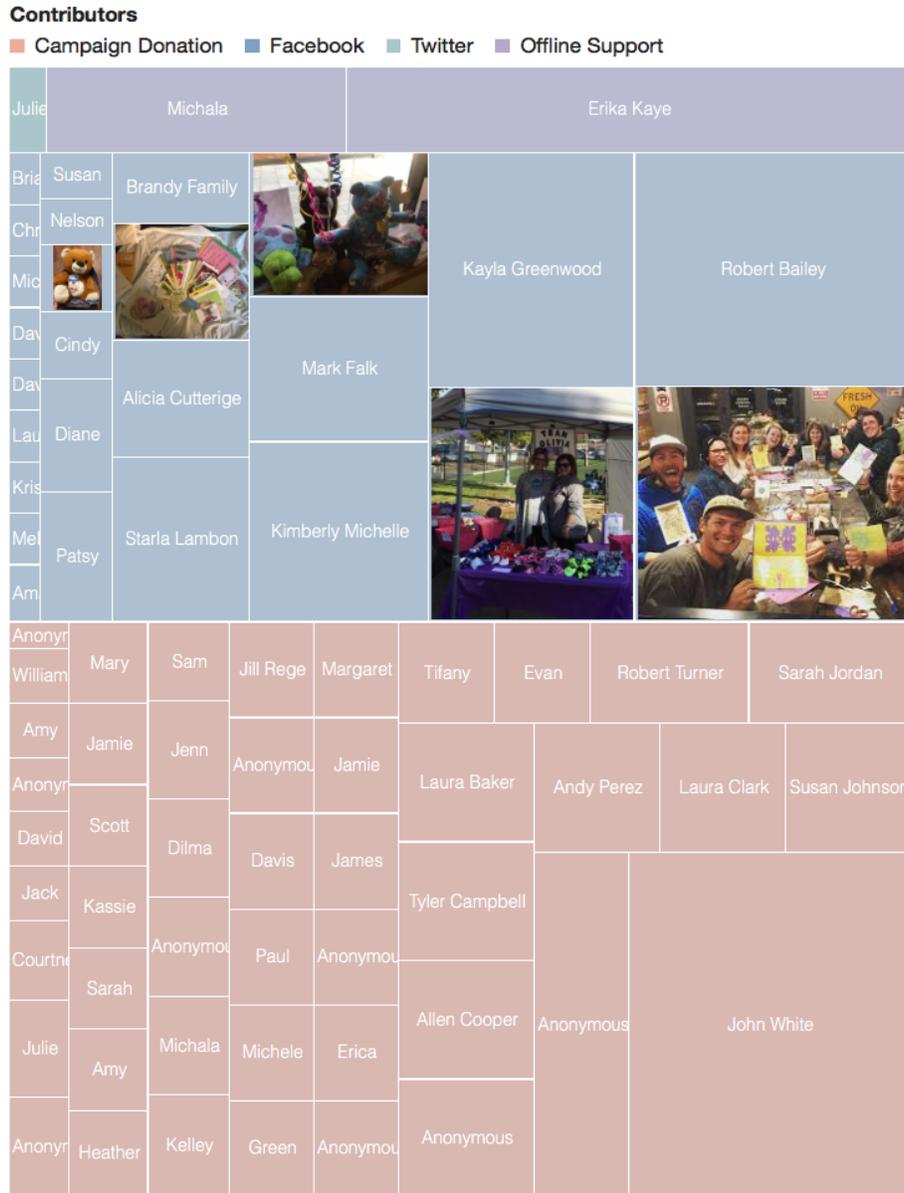


Figure 6.3: Treemap View: The size of each rectangle represents the amount of contributions. Each color represents different types of contributions

Contributors

■ Campaign Donation ■ Facebook ■ Twitter ■ Offline Support

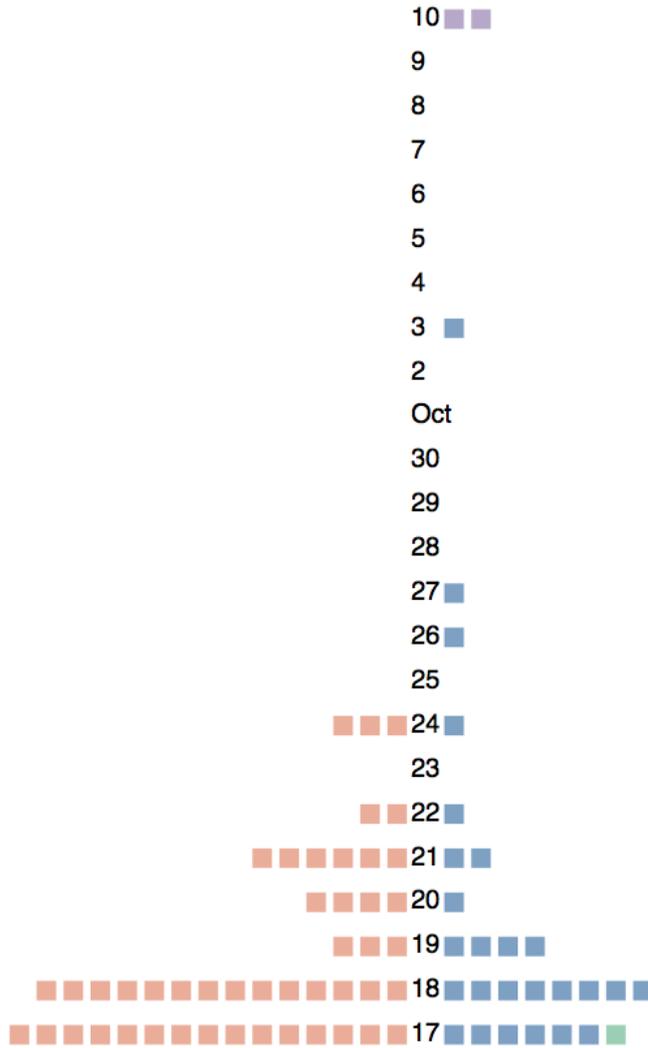


Figure 6.4: Histogram View: Rectangles on the left side of the timeline represent monetary contributions to a campaign. Rectangles on the right side of the timeline represent non-monetary contributions. By placing the same day's contributions on the same row, we can identify the correlation between the two types of contributions.

impact of non-monetary contributions, 2) various non-monetary contribution opportunities, and 3) the patient’s detail information that can be inferred from contributors’ support messages. To address these challenges, we decided to emphasize three aspects of non-monetary contributions – impact, opportunities, and detailed contents – on medical crowdfunding campaigns. First, to present detailed contents, we presented the names of each contributor, and pictures and messages shared by the contributors. This was based on a prior study showing that people can infer rich background story of medical crowdfunding patients through non-monetary supporter’s messages and pictures [100]. Second, to estimate the impact of non-monetary contributions, we asked each beneficiary participant to assess the value of non-monetary contributions he or she received. Finally, to present various opportunities of medical crowdfunding contributions, we categorized contributions based on common features and a hierarchical structure emerged. For example, contributions were categorized into monetary and non-monetary contributions. Non-monetary contributions were further categorized into campaign promotions and offline support.

With the goal of visualizing these three aspects in the most effective manner, we chose visualizations that could best highlight those three axes based on visualization literature that compares graphical presentations [101, 102, 103]. Below, we show how we highlighted each aspect in the table, double histogram, and tree map views.

Table View

The table view was chosen because detailed contents such as long messages or pictures shared by each supporter can be presented in the most straightforward way [103]. Moreover, the table view is similar to the current form of the monetary contribution interface on medical crowdfunding campaigns (Figure 6.2). Therefore, I anticipated that people would easily make sense of detail contents from the table view.

In the table view, the impact of contributions was presented in text form using the amount value that each beneficiary participant estimated (e.g., \$100). In the existing monetary contribution interface, GoFundMe, each monetary contributor’s name, contribution amount, contribution date, and contributor’s message are presented in each row, and contributions are ordered in reverse chronological order (newest first). In our table view, in addition to existing contribution features, we added new contribution features that incorporate the non-monetary contribution data: contribution types, pictures, and links to the contribution source (Figure 6.2). Finally, I showed the contribution types (e.g., social media sharing) as icons in the table view to expose viewers to various contribution opportunities.

Histogram View

The double histogram view was selected to highlight the impact of non-monetary contributions on campaign monetary donations. To effectively highlight the impact, we considered two criteria. First, we looked for visual designs that can highlight the relationship between monetary and non-monetary contributions [101, 102, 103]. Second, we searched for designs that can take into account the temporal relationship between campaign monetary donations and non-monetary contributions (e.g., campaign donations typically come a day or two days after the campaign promotions).

From prior research [101, 102, 103], we considered various visualizations such as double axis, scatter plot, bubble that, timeline, and histogram that could satisfy the criteria. We ended up choosing double histogram as it was the only visualization that meets both criteria. Our histogram view is inspired by AuthorLines, which shows two variables along the same timeline and thereby highlights the relationship between the two variables [63]. Our temporal series of double histograms shows co-occurring non-monetary and monetary contributions (Figure 6.4). Each rectangle represents one contribution event regardless the type of contribution. By placing monetary contribution rectangles on the left side of the timeline and non-monetary contribution rectangles on the right, viewers can easily note the correlation between the two types of donations. We designed this visualization to highlight campaign promotions that have an impact on monetary donations.

The detail content of each contribution is shown when people mouse over each rectangle of contributions in the double histogram view (Figure 1-3). Various contribution opportunities are highlighted with different colors (e.g., campaign donations are presented with pink color).

Treemap View

The treemap view was chosen to emphasize various contribution opportunities in medical crowdfunding. When we categorized various types of contributions, as mentioned above, a hierarchical structure emerged. To best present the hierarchical structure, we considered circle packing, tree diagram, and treemap based on prior research [103]. Among those visualizations, we selected the treemap view because it most effectively displays a large number of items in a limited space. Furthermore, the treemap visualization serves as a fingerprint of the contribution space by visually representing the structure or the hierarchy of a dataset. boyd et al. stated that a visualization "should serve as a fingerprint of the space" [104]. Our treemap view (Figure 6.3) shows the distribution of contribution by members and by the type of contribution. By coloring and grouping contributions by contribution

types and labeling each cell with the contribution's name, the viewer can easily observe the landscape of the contributions for a given campaign in a single visualization.

In the treemap view, the impact of contributions is presented with the size of the rectangle. The details of each contribution, such as contributor names and pictures shared by contributors, are presented within each rectangle. The detail messages are shown when people mouse over each rectangle.

6.2.2 Participants

To recruit medical crowdfunding beneficiary and contributor participants, we made a broad recruitment call via a University mailing list and on various online communities such as Craigslist and Reddit. We also posted flyers in public places. We targeted sub-reddits related to charity, fundraiser, and medical crowdfunding sites (e.g., GoFundMe subreddit) because medical crowdfunding beneficiaries and contributors often promote their campaign on those sub-reddits. We could not recruit participants from online crowdfunding sites such as GoFundMe and YouCaring because the sites no longer allowed recruiting.

Our inclusion criteria limited participants to those who have participated in online medical crowdfunding campaigns via online crowdfunding sites such as GoFundMe. We restricted our criteria to crowdfunding sites because our study investigates possible ways to present contributions that would replace an existing contribution interface. Therefore, people who have privately raised monetary donations via personal Paypal accounts or conducted offline fundraising were excluded from our study. We only recruited 1) people who have created or benefited from medical crowdfunding campaign webpages and 2) people who have contributed through medical crowdfunding campaign webpages. To verify that people who signed up for our study met the inclusion criteria, we asked them to submit a URL for a medical crowdfunding campaign in which they had participated. We reviewed each person's campaign URL and recruited 15 participants who met our inclusion criteria that include six beneficiaries and nine contributors of medical crowdfunding campaigns. Of our 15 participants, 12 were female. The average age of the participants was 32.

6.2.3 Study Procedure

Our study consisted of two sessions: a data collection session and a semi-structured interview session. During a data collection session, we collected participants' monetary and non-monetary data prior to the interview in order to show participants' own data in the visualizations. We then conducted semi-structured interviews while participants interact with

visualizations. The interviews with beneficiary and contributor participants took about 90 minutes and 60 minutes, respectively. After the interview, we offered \$30 and \$20 gift cards to beneficiary and contributor participants, respectively. Beneficiaries were compensated more than contributors because they shared their sensitive medical and financial situations.

Data Collection

Prior to each study, all participants were asked to provide a link to their campaign or a campaign that they have contributed to. From the campaign webpage, we pulled monetary contribution data including contributors' names, contribution amount, and contributors' messages. We also collected social media sharing activities associated with the campaign by searching for the campaign URL on various online sites such as Google, social media (e.g., Facebook, Twitter, and Instagram), and online communities (e.g., reddit, personal blogs). We also asked participants to provide offline contributions that they had received or provided. Those offline contributions included monetary donations that they had received offline, offline fundraising events, or being delivered food in the hospital.

Semi-structured Interviews with Visualization Probes

Inspired by technology probes that deploy core features of a future system to examine how users interpret them [105], we conducted visualization probes using three web interfaces that visualize both monetary and non-monetary contributions in different ways. The data visualized on the interfaces were customized to each participant to increase their ecological validity. We first had participants interact with each visualization and asked them to talk aloud about any patterns and inferences they could find from each visualization. We then began the interview by asking their perception of each visualization and the possible uses of each visualization when they interact with the campaign beneficiary or other contributors. More specifically, for beneficiary participants, we asked about the possible impact of visualization in managing their campaign and contributors. For contributor participants, we asked them about influences that the visualization could have on their contribution activities. We further inquired about how the visualizations might affect their perception of the medical crowdfunding beneficiary and other contributors. After probing the participants' perception of each visualization, we asked them to rank the visualizations in the order of their preference for use on their medical crowdfunding campaign. We also asked why participants preferred one visualization over another.

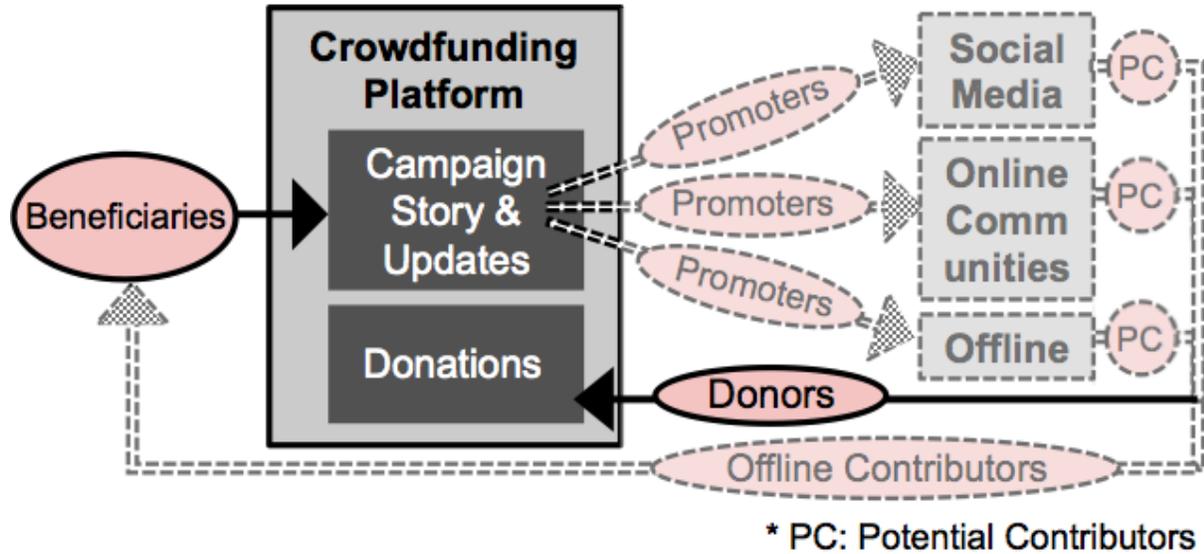


Figure 6.5: The diagram shows the current contribution structure of crowdfunding stakeholders – Beneficiaries, contributors (including campaign promoters, donors, and offline contributors), and potential contributors (PC). The black solid arrows indicate contribution behaviors that are highly visible on a crowdfunding platform. The grey dashed arrows show contribution behaviors that are not visible on a crowdfunding platform.

6.2.4 Data Analysis

We recorded and transcribed all interviews. We applied an open coding approach to analyze what benefits and drawbacks medical crowdfunding beneficiaries and contributors perceive in the use of visualizations during the medical crowdfunding process. Two researchers coded each line of the interview scripts based on the proposed use of the visualization, which ranged from medical crowdfunding management to identifying a broad range of contributions. Based on this first round of coding, we identified broad themes, such as possible uses of visualization in fostering collaboration and competition. We then re-coded the data to determine which feature of each visualization would influence those high-level themes. In the next section, we present the resulting themes.

6.3 RESULTS

Our goal is to understand the general preference for, and the expected benefits and drawbacks of, various visualization techniques designed to support social translucence in medical crowdfunding. As shown in Figure 6.1, the current contribution procedure in medical crowdfunding is fragmented as the beneficiary, contributors, and potential contributors cannot see

the non-monetary contribution behaviors of campaign promoters and offline contributors that occur outside of the platform. The only contribution behaviors that are currently visible to everyone on a medical crowdfunding platform are the beneficiaries' updates and donors' monetary donations—many essential parts of the medical crowdfunding process are only visible to people within the same external platform (e.g. social media, online community). As I previously mentioned, studies have shown that this limited visibility results in three major problems for beneficiaries, contributors and potential contributors [17].

This following section shows how the detail- and pattern-oriented features in three different types of visualizations can solve different aspects of the visibility problem by enriching social translucence in medical crowdfunding. I then report three different, opposing themes that resulted from detail-oriented and pattern-oriented features in the context of medical crowdfunding campaigns.

6.3.1 Detail & Pattern Oriented Features in Visualizations

The notion of pattern-oriented features and detail-oriented features emerged when I analyzed participants' preferences for each visualization. Pattern-oriented features are defined as an abstract form of aggregated data that highlights certain trends (e.g., correlation) underlying the data. For example, in the histogram view (see Figure 6.4), the correlation pattern between non-monetary and monetary contributions conveyed the previously invisible contribution pattern of how specific promotions led to more donations, promotions, and offline contributions. Similarly, the hierarchical structure pattern in the treemap view (see Figure 6.3) highlighted different types of invisible non-monetary contribution behaviors and allowed contributors to become more *aware* of the opportunities for non-monetary contribution activities.

Detail-oriented features focus on qualitative features of contribution data such as contributors' names, messages, and pictures presented in a visualization. These features helped participants become aware of how contributors sincerely supported patients because their messages and pictures signal how much patients were and are meaningful to the contributor. On the other hand, presenting too many details, as in the table view in Figure 6.2, prevented participants from noticing the diverse types of contributions that were given to medical crowdfunding campaigns.

In the following sections, I explain which visualization patterns and details were perceived as appropriate for public or private uses in medical crowdfunding campaigns.

Table 6.1: Detail and pattern-oriented features in each visualization are described. I also report why the detail and pattern oriented features are perceived as appropriate for public and private uses.

| Visual-ization | Feature | | Why the feature is appropriate for public | Why the feature is appropriate for private |
|-----------------------|----------------|---|--|---|
| Table | Pattern | Chronologically ordered contributions | Identifying activeness of a campaign | |
| | Detail | Contributor names, messages, pictures, amounts | Feeling touched | |
| Tree-map | Pattern | Proportions of contribution amount | | Fostering comparison and competition |
| | | All contributions in one space | Feeling a sense of community | |
| | | Color-coded contribution types | Understanding various contribution types | |
| | Detail | Contributor names, pictures | Feeling a sense of community | |
| Histo-gram | Pattern | Correlation between non-monetary and monetary contributions | Fostering collaboration | Identifying effective strategies for raising more donations |
| | | Decreasing trends | | Possibly influencing contributions in a negative way |

6.3.2 Preferred Uses of Detail & Pattern-oriented Features in Public & Private Spaces

In this section, I report three themes, each a pair of opposing principles, that illustrate why pattern- and detail-oriented features in visualizations were perceived as appropriate for public or private uses.

Human Characteristics over Analytical Components

All of our participants acknowledged the practical value of the pattern-oriented features showing correlations between monetary and non-monetary contributions in the histogram

view because they helped to identify effective strategies for fundraising. For example, participants could relate the number of donations to campaign promotion activities using the histogram. They eventually inferred the the identity of the person who elicited the highest number of donations.

"knowing who draws the most donation, I think it's a cool thing for people who are organizing this. If someone draws that many donations, maybe ask this friend to make another post because they do have a lot more impact in social media. I think that the biggest benefit would be to the people trying to raise the money themselves so that they know who has the most impact overall." -C6

Participants were also excited to discover unexpected patterns or incidents from the histogram view. For example, one supporter was surprised that an update containing a funny picture taken from the hospital got more shares and donations than other serious medical updates. Furthermore, when some beneficiary participants observed a distinct pattern where they received many donations without any non-monetary contributions noted on the histogram view, they drew from their memories and talked about why this pattern might have occurred.

"I know these three [donations] came in because a friend sent an e-mail like on June 23rd. I can relate to why that is happening right now. A friend of mine in New York asked how we were doing and what we needed and she sent an e-mail after talking to me. I didn't even ask her to do it. So this is really cool." -B2

Interestingly, this analytic components of the histogram view also made participants perceive it as "impersonal." As a result of this, they were reluctant to display it publicly on the front page of a campaign. Two reasons were given for this impression. First, participants described that the number of rectangles reminded them of a dashboard or a spreadsheet, which highlights a "numerical" or quantitative nature, a competition of sorts. Second, detail-oriented features that were not directly visible from the histogram view made the histogram view impersonal compared to other views. For example, participants often compared the histogram view to the table view. The table view was perceived as personal because participants could see contributors' names, messages, and pictures upfront. This finding is consistent with Kim et al.'s work, which showed that those detail-oriented features help people find more personal connections to the beneficiary [100]. On the other hand, in the histogram view, the detail information was not visible and participants had to hover over each rectangle to see the details. Therefore, instead of publicly displaying a histogram view on a campaign, our participants wanted to use the view for private data analytics.

"It [histogram view] doesn't add that personal touch. I think the table definitely tells a story. I'm more easily able to see people's message, and how much they're donating and

their names, instead of having to hover over each dot and see what they say. It [histogram view]'s a little technical. I can see this being helpful for people who are actually trying to improve the campaign and for future direction.” -C5

Collaboration over Competition

The correlation pattern in histogram visualizations assisted participants in planning for a more efficient collaboration. Seeing the pattern of non-monetary contributions leading to donations motivated participants to share a campaign more on social media, ask an influential person to share more, and express gratitude to non-monetary contributors.

”If someone draws that many donations, [I’ll] ask this friend to make another post because they do have a lot more impact in social media.” -C6

Half of our participants liked the treemap view as it visually showed the collaborative effort of a larger community in supporting the beneficiaries. Beneficiary participants felt touched to see a lot of small monetary and non-monetary contributions come together to comprise a large portion of total donations. Since beneficiary participants can visually see that many people cheer for their speed recovery from medical conditions, they wanted to give back to those contributors by giving updates about their medical progress and how they used the contributors’ donations. They felt responsibility for using the collected funds more honestly and expressing gratitude to the community.

The treemap uses color-coding to emphasize variations in contribution types and distinguish each type. This approach led contributor participants to be aware of various non-monetary contribution opportunities and motivated them to join the collaboration. Finally, the overall design of the treemap view gave participants a sense of belonging because they felt a part of the community by seeing their name integrated into the community “quilt” or landscape.

”Design looks like building a house. You have to pile many tiny rocks and it takes so long to build one wall. It looks like people work hard. It’s like building something towards the goal. It can be house. It can be a hope or anything. But, I think people are donating and everything is together, and it makes them feel a sense of belonging.” -B1

However, most of our participants worried about publicly displaying the proportions of contribution amount, especially for monetary donations, highlighted in the treemap view on the campaign interface because it might foster comparison and competition among contributors. Participants expressed concerns that some contributors who intended to contribute a few dollars might not contribute to the campaign at all because they did not want to see their name represented at a small scale. On the other hand, other participants commented

that the competition might have a beneficial aspect as it might spur some contributors to contribute more because they want to see their name bigger publicly on the campaign. This finding was consistent with Smith et al.'s work showing that a large donation amount from peers may spur competition to be the top donor [24].

"This almost looks like a score board. If you wanted to try to be competitive about it, you might want to make your name bigger. -C3

Comprehensive Information vs. Information Overload

Our participants valued pattern-oriented features of visualizations that provide an comprehensive and integrative view of both non-monetary and monetary contributions. For example, as I mentioned earlier, beneficiary participants felt touched and cared for when seeing all the contributors' names in the treemap view as they could know that families, friends, and even strangers in different domains of their life supported them together. Furthermore, contributor participants said that seeing their name surrounded by the names of other contributors elicited a sense of belonging. On the other hand, participants worried that the size of rectangles in the treemap view might emotionally discourage other potential contributors. I chose to indicate the contribution amount through size because previous research showed that visualizing the amount of contribution helped people better understand overall interaction patterns within an online community [50, 70, 63]. However, in medical crowdfunding, participants were very cautious about explicitly indicating the monetary contribution amount in public because the amount could imply sensitive information such as their socio-economic status. Participants were also concerned about showing contributions in different sizes because they valued each contribution equally.

"Every small or large contribution was a beautiful gesture. I don't want the people who have means [to] necessary outshine the people, that maybe \$10 is a lot harder for one person than \$200 for this one person who has a pretty good job or [has] more rich parents or something. I don't want class to be so visibly indicated in whether or not you make a difference." -C1

Moreover, participants perceived that publicly showing the correlation between non-monetary and monetary contributions might be overwhelming for contributors. Participants worried that if contributors see the campaign promotion that prompted them to donate, contributors might think that they were strategically targeted for soliciting donation. Beneficiary participants would not want to publicly present their strategic motives on their campaign because this would contradict the emotional motivations of donation, such as compassion and altruism.

"I just think it's too much information for someone who's making donations. For example

it's just too much for them to see 'oh, I donated it because of this post.'” -B2

Finally, the overall pattern that showed a decreasing number of both monetary and non-monetary contributions in the histogram often discouraged beneficiary participants because it signaled that people did not care about the campaign anymore. Participants worried that people might no longer contribute to the campaign when they saw the decreasing pattern in the histogram view.

”It shows that how long people cared. And at one point they just kind of stopped caring. There's like a six-week arc where people will tend to give you for a certain amount of time. When that time is over they just kind of stop. Oh I think that that really represents that.”-B3

6.4 DISCUSSION

This work offers a new way of considering social translucence in the context of designing crowdfunding platforms where users' activities occur across various online sites. Prior work on social translucence mainly focused on making invisible information that is already available on the site more visible (e.g., log history) to facilitate users' communication and collaboration [54, 51]. However, this study goes beyond this assumption that all essential information is available on the site. For example, in many collective activities such as crowdfunding or crisis responses on social media, people work across sites to achieve a common goal [106, 17, ?]. Therefore, it is important to support social translucence across various sites to help people become more aware of each others' activities and thus accountable for one another. To the best of our knowledge, our work is the first attempt to investigate various ways to visualize across sites' activities to support translucence.

In his work on social translucence, Gilbert identified an area in social network structure where the theory of social translucence broke down due to the one-way visibility in social network sites [107]. Similarly, I illustrate the role of social translucence in the domain of medical crowdfunding. Since the concept of crowdfunding did not exist when the social translucence theory was built, examining the role of social translucence in medical crowdfunding can offer novel theoretical guidances for crowdfunding platform designers.

In this section, I first interpret the study results in the context of social translucence theory. I then suggest representations that can better highlight the philanthropic cause when enriching social translucence in medical crowdfunding campaigns. I further discuss how the study findings can contribute to a broader philanthropic research community as those communities also aim to promote pro-social behaviors and build a sense of community among volunteers working across various online and offline sites [108, 109, 106, 29, 25, 110].

6.4.1 Enriched Social Translucence

This work enriched social translucence by making campaign promoters and offline contributors who work behind the crowdfunding platform *visible* to everyone on a medical crowdfunding platform. In this section, I organize our findings in the context of the social translucence framework—visibility, awareness, and accountability—and suggest how other crowdfunding research could benefit from the enriched social translucence.

This work showed that enriched translucence helps beneficiary participants become *aware* that more people care, work, and cheer for the beneficiaries themselves. Becoming aware of many people’s involvement in their crowdfunding campaign made beneficiary participants feel *accountable* for using the collected funds more honestly. Our participants further mentioned feeling responsible for writing updates on their medical progress and the uses of their funds to express gratitude to their large community of contributors including monetary and non-monetary contributors. These frequent updates were also shown to establish the credibility in a medical crowdfunding campaign [28].

Establishing the credibility of a crowdfunding campaign is a critical factor for success in both philanthropic and entrepreneurial crowdfunding [25, 111]. In philanthropic crowdfunding, the perceived legitimacy of a campaign draws contributions because potential contributors want to ensure that their funds are used to benefit the cause that they donated for [25, 28]. In entrepreneurial crowdfunding campaign, the active communication behaviors—frequent and regular updates—influence trust by showing the diligence of the fundraiser, and have led to an increased rate of success of the campaigns [20, 111]. Therefore, crowdfunding research communities could benefit from enriched social translucence since making previously invisible crowdfunding contributions visible could help establish trust on crowdfunding.

Furthermore, our study showed that making a wide range of non-monetary contributions and their impact *visible* made contributor participants become *aware* of more non-monetary contribution opportunities that they can participate in. Especially, contributor participants were interested in offline contribution opportunities as many did not even know the opportunity exists due to its invisibility. The crowdfunding sites can facilitate offline contributions by allowing the beneficiaries to list all possible opportunities and allowing the contributors to sign up [8, 17]. Such interface will not only recognize offline contributors’ activities in front of all other contributors, but also make contributors who signed-up for the contributions feel more *accountable* for delivering their commitment.

Other philanthropic crowdfunding communities such as education and disaster support can also benefit from this enriched social translucence as they also have various non-monetary contribution opportunities such as donating stationery, food, or volunteering for organizing

shelters for those affected by disaster. Enriched social translucence could widen more contribution opportunities in philanthropic crowdfunding by recognizing a wide range of currently invisible contribution behaviors on their platform.

6.4.2 Representations for Philanthropic Causes

Our results show that presenting various online and offline channels helped participants obtain a more comprehensive view of the contribution infrastructure that supports medical crowdfunding campaigns. This comprehensive view was achieved by the pattern-oriented features in visualizations that integrated all types of contributions in one space. Despite the pragmatic benefit of pattern-oriented features in helping participants gain a comprehensive view of the campaign contribution infrastructure, participants expressed concerns about publicly showing the analytical view on medical crowdfunding campaigns.

This desire to show specific information in public and private spaces maps onto Goffman’s front and back stage analogy, respectively [112]. Goffman explains that in the “front stage” where an audience is present, performers wish to selectively present themselves as a part of the performance. However, on the “back stage” where only performers are present without any audience, they freely express actions that were not allowed on the front stage. In medical crowdfunding, seeking monetary donations was considered something people should do on the back stage. In the front stage, people were expected to emphasize care, collaboration, and community. The different needs of the front stage and back stage suggest the need for different interface features for public and private components of medical crowdfunding campaigns. In this section, I show different types of representations appropriate for public and private purposes and how this finding can contribute to a broader philanthropic research.

For the public view, our study found the limitations of visualizing quantitative features of contributions (e.g., increases or decreases of contributions or sizes of contributions) in conveying the contributors’ sincerity, efforts, and love for the beneficiary. The contributors’ collective care for the beneficiary forms the beneficiary’s identity as a person who is loved by a large community [100]. However, the number and size of rectangles, charts, and graphs were limited in depicting the human characteristics that contribute to the beneficiary’s identity. Participants wanted to see more personal elements such as messages, names, and pictures of contributors to feel the contributors’ care for the beneficiaries. The visualization research community has also examined effective ways to visualize humanitarian data to elicit empathy and pro-social behaviors such as donation. For instance, visualization practitioners have suggested using anthropomorphized graphics (e.g., isotype [113]) to demonstrate a “human dimension” of the abstract data instead of existing chart visualizations as they have more

immediate visual connection to people. However, a recent study by Boy et al. found that anthropographic and standard charts had no significant difference in eliciting empathy and pro-social behaviors [114], which signifies that changing the form of visualizing illustrating quantitative features is still limited when representing human characteristics.

Instead of visualizing quantitative features of contributions, our results suggest that visualizing qualitative features better convey the community’s sincerity, efforts, and care. Those qualitative features include a broad range of support activities, diverse topics that supporters discuss about the cause (or beneficiaries), reciprocal communications among supporters, and pictures of offline support activities. For example, in a philanthropic community like Red Cross, a potential volunteer might be more willing to help people affected by an earthquake after seeing a broad range of difficulties that people face (e.g., losing homes, lack of food, deficit care for children who lost their parents) rather than the number of people affected by an earthquake. This idea of highlighting concrete situations and stories of victims rather than quantified features of victims follows the concept of the “identifiable victim effect [115, 116].”

The identifiable victim effect suggests that people are more willing to contribute their resources to help identified victims rather than unidentified or statistical victims [115, 116]. Through our results, I found that a categorical visualization such as a treemap and qualitative data of non-monetary contributions have adequate features to bring out the identifiable victim effect. Therefore, to highlight stories of people affected by crisis events, I suggest visualizing the broad range of difficulties faced by people in a treemap and adds stories to the visualization. For example, breaking down a difficult situation (represented by the entire treemap) into specific challenges people face (represented by big rectangles in the treemap) might help more people relate to the cause and the affected people. To incorporate more context and story into the visualizations, each category can be further divided into individual stories, represented as small rectangles. When people click a smaller rectangle in a category, they can read actual stories and see photos and videos of the affected people or volunteers who are helping them. This visualization highlighting qualitative features over quantitative features could signal the community’s care for the cause and may attract more volunteers to join the community.

In the private view, as our study demonstrated, visualizations highlighting quantitative features of contributions using analytical components can help beneficiaries better identify effective strategies for fundraising such as finding the types of updates that had the most impact on the contributions or finding contributors who raised a large amount of money from sharing. To better support fundraising strategies, the medical crowdfunding community could also benefit from other commercial analytic tools used by digital volunteers in

philanthropic communities [106] such as TweetTracker [117] or Ushahidi [118]. Such tools not only track various social media data but also allow users to curate the data in a more flexible way by filtering and labeling the data using keywords, hash tags, and locations. Furthermore, they make the visualizations more interactive and use the configurable bars and timeline views to support the data analysis process. These flexible and interactive data analysis tools can also help medical crowdfunding beneficiaries to find insights from their contribution data.

6.4.3 Privacy & Ethical Considerations

The social translucence framework suggests the design of online collaboration systems that make contributors' behaviors visible to one another. However, the visibility often causes privacy issues, so the concept of "translucence" plays an important role here. This is why this work uses the term enriched social "translucence" instead of transparency. I want to highlight the danger of revealing too much sensitive information in medical crowdfunding campaigns when incorporating external non-monetary contributions. In this section, I discuss guidelines for including non-monetary contributions in visualizations by considering both dangers of revealing excessive details and benefits of including more informative contents to emphasize the value of the medical crowdfunding cause.

Our study results show that the privacy issue of enriched social translucence comes into play when visualizing the monetary contribution amount. Since many crowdfunding contributors know each other, seeing each others' contribution amount made people compare and judge other contributors [100]. Furthermore, visualizing external non-monetary medical crowdfunding contributions can reveal potentially sensitive patient's private information such as a personal back story about their medical conditions or financial situations. For example, when a supporter shares a crowdfunding campaign that raises money for a baby's surgery, she might write additional details such as the multiple rounds of fertility treatments the baby's parents had go through to have this baby, other co-existing ailments, or medical test results. Although the additional information provides a richer back story and credibility to the original medical crowdfunding story, beneficiaries may not want to share such private information in public space.

On the other hand, some types of non-monetary data can better signal the worthiness of the medical crowdfunding cause over others. For example, Kim et al. found that messages from the beneficiaries' friends who mentioned the beneficiary's giving personalty or good shared memories with the beneficiary signal the credibility of the cause compared to more generic messages such as good luck [28]. Other research in philanthropic crowdfunding

such as crowdfunding for loan lending, educational support, and stigmatized individuals suggest that the social cues signaling the interpersonal similarities between the cause and contributors (e.g., background or belief) [73, 119, 100] or the beneficiaries' expression of appreciation to contributors are likely to draw more contributions [29]. Future research could investigate how to highlight those data in a real philanthropic contribution setting and how they influence the contribution and collaboration behaviors.

CHAPTER 7: COMMUNITY JOURNEY: BUILDING A SENSE OF COMMUNITY AROUND COLLECTIVE COMMUNITY SUPPORT

Drawing on the results from Chapter 5 and 6, I built a crowdfunding interface, Community Journey, to examine whether recognizing the entire collective endorsements – community support around medical crowdfunding patients – can make strangers feel more a sense of community and participate in a campaign (Figure 3). To achieve this goal, I designed and developed Community journey based on the sense of community model. This chapter contributes to designing interfaces that can build a sense of community in order to encourage participation in a community. Specifically, I answer the following two research questions.

7.1 RESEARCH QUESTIONS

R1: How does the Community Journey interface impact a sense of community among potential medical crowdfunding supporters?

R2: How does the Community Journey interface motivate potential supporters to participate in a medical crowdfunding campaign? Participation is measured by 1) making monetary donations, 2) sharing a campaign on social media, 3) writing a message on the campaign page, and 4) making offline contributions.

7.2 METHODOLOGY

In this section, I describe the rationale for designing the Community Journey interface and a between-subjects online survey that I conducted to evaluate the interface. For the between-subjects online survey, I first explain a process of choosing a medical crowdfunding campaign used in the survey. I then illustrate the rationale for designing the control and the experimental versions of an interface for this study. Finally, I present details of our survey study.

7.2.1 Process of Choosing a Campaign & Collecting the Campaign related Contribution Data

One of the goals of this study was to bring a rich set of invisible campaign promotions and offline contributions to the forefront on a medical crowdfunding campaign to understand their impact on enhancing the sense of community among donors. Therefore, I selected a campaign with a rich set of campaign promotions and offline contribution data (e.g.,

sending food or babysitting) – at least five campaign updates as well as 20 publicly available campaign promotions and offline contributions. While these offline and online donations are commonplace in medical crowdfunding campaigns, such interaction data is difficult to obtain from public sources (e.g, Facebook, Twitter) because campaign supporters often promote a campaign on their own social media and provide offline contributions face-to-face. Based on the criteria, I chose a campaign shown in Figure 7.1.

The medical crowdfunding campaign used in this study was created for a 3-month-old, Olivia, who was struck by a softball while attending her father’s softball game. To collect publicly available non-monetary contributions – campaign promotions and offline contributions – I searched for Olivia’s campaign URL on Google, popular social media sites, and online communities, and collected campaign promotions. For offline contribution data, I found a Facebook page where Olivia’s parents and supporters posted pictures and messages about offline contributions that they received and provided, such as an offline fundraising event, gifts, and cards. While going through each post on the Facebook page, I collected all the pictures and messages related to offline contributions.

7.2.2 Control Condition: Existing Crowdfunding Interface

I designed the control condition interface by closely following the design of the largest crowdfunding website, GoFundMe. I did not use Olivia’s actual crowdfunding campaign webpage in this study because I wanted to anonymize all the names and pictures appearing on the real campaign to protect the privacy of the patient and their supporters. As shown in Figure 7.1, this control version interface contains all the core features of a real crowdfunding campaign. For example, on the left side of the interface, a campaign profile picture, story, and updates are presented. On the right side, campaign title, fundraising goal amount, currently raised donation amount, and individual donors’ information are presented.

7.2.3 Experimental Condition: Community Journey Interface

In the Community journey interface (Figure 7.2), I used the same campaign information as in the control version. In comparison to the control version, I made two major changes. First, I added non-monetary contribution data including campaign promotions and offline contributions in the support activity section located on the lower-right corner of the Community Journey interface. Second, I added and changed four interface features based on the four elements defined in McMillan and Chavis’s sense of community model: Community membership, Fulfillment of Need, Influence, and Shared emotional connections. In the fol-

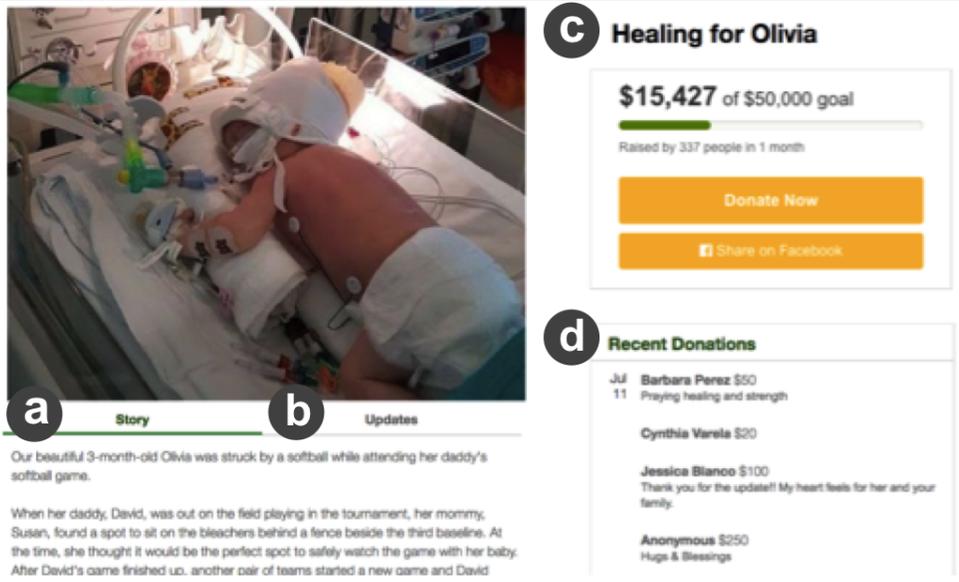


Figure 7.1: The control interface closely follows the design of an existing crowdfunding interface. (a) A picture of the patient and a story describing the reasons for raising monetary donations, (b) updates, (c) a campaign title, fundraising goal, and currently raised donation amount, and (d) all the donors' names, donation amount, and messages are presented.

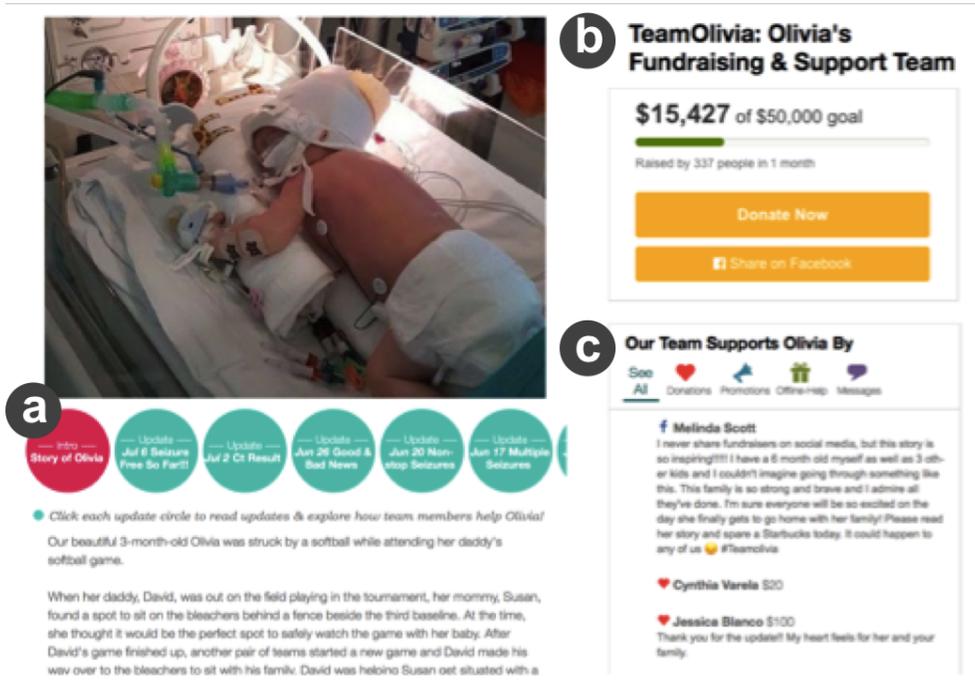


Figure 7.2: In the Community Journey interface, three major changes were made from the control version interface. (a) The design of updates and (b) the campaign title are changed. (c) Non-monetary contribution data such as campaign promotions and offline contributions were added to the support activity section and the interaction feature between the updates and contributions.

lowing section, I define each community element and explain how each is emphasized on the Community Journey interface.

Community membership indicates a feeling of belonging or identification with a community [15]. Highlighting the community identity is important because the more people relate to the community identity, the more they feel a sense of belonging with the community. Medical crowdfunding community identity can be defined as a community where a group of people come together to raise monetary donations for a patient by donating money, promoting campaigns, and providing offline contributions [17]. However, this identity is not well emphasized on existing crowdfunding interfaces for the following two reasons.

First, existing crowdfunding interfaces focus only on monetary contributions by recognizing only monetary donor's names and donation amounts. This imbalanced recognition of contributions gives an impression that the community being around monetary contributions only; supporters perceive that non-monetary contributions are less valued than monetary contributions [17]. Medical crowdfunding patients also worry that supporters might perceive them as a person who is only looking for money, even though patients value non-monetary contributions as much as monetary contributions [100]. In the Community Journey interface, therefore, I presented the crowdfunding community identity as a support community that equally values both monetary and non-monetary contributions by explicitly stating that Our Team Supports Olivia by Donations, Promotions, Offline-Help, and Messages in the support activity section on the lower right corner of the Community Journey interface shown in Figure 7.2. People can see the details of support activities, such as supporter's names, messages, and pictures when clicking on monetary or non-monetary contributions.

Second, existing crowdfunding interfaces do not highlight the crowdfunding community identity as a team of supporters who work together to achieve a funding goal. Rather, a medical crowdfunding campaign is perceived as a space where people donate money to the patient [17]. Typically, other medical crowdfunding campaigns have titles such as Healing for Tom or Scott's Medical Funds. To highlight the community identity as one team, I changed the title of the medical crowdfunding campaign from the original Healing for Olivia to TeamOlivia. I then added a description that clarifies that this team is not only for fundraising but also for general support.

Fulfillment of Need refers to the belief of community members that their community will be able to fulfill their desire or need. One of the desires of medical crowdfunding supporters is to see the patient's recovery process [15]. Highlighting the patient's medical progress is important because it shows that supporters' contributions helping the patient make progress

towards recovery. Patients' progress is often reported on medical crowdfunding updates [100]. However, in the existing medical crowdfunding interface, progress is not very visible unless people click the update section (see Figure 7.1). In the Community Journey interface, I emphasized the patient's progress by summarizing the content of each update in each colored circle on the front page of the campaign interface (see Figure 7.2). Reading the summary of each update in the colored circles, people can see the patient's medical progress since the launch of the campaign at a glance. The details of the update content are presented when each update circle is clicked.

Influence refers to reciprocal interactions among group members. Reciprocal communications occur between medical crowdfunding fundraisers and supporters via campaign updates and support activities. For example, once the patient's status or progress is posted on a campaign update, supporters respond to the update by donating money or sharing the update on their social media. If the update content is about something that needs offline contributions such as notifying the patient's surgery date, contributors provide necessary offline support such as sending flowers or gifts to the hospital or offering to babysit during the patient's surgery and hospital stay [17]. However, this reciprocal communication is not highlighted in the existing crowdfunding interface. Because the campaign updates are not connected to the corresponding support activities, it is difficult to understand which update elicited what support activities. In the Community Journey interface, I highlight reciprocal communication. When each update is clicked (Figure 7.2-a), the support activity section shows the support activities provided after the update was posted (Figure 7.2-c). This interface further helps supporters see how their support activities influence the patient's progress.

Shared emotional connections are defined as a feeling of bonding rooted in community members' shared history. In medical crowdfunding, this shared history can be 1) supporters' shared history with the medical crowdfunding patient or 2) any support activities that supporters have done together. These two shared histories are frequently found in messages and pictures in the campaign promotions and offline contribution data. In campaign promotions, supporters often explain their shared history with the patient, such as their relationship with the patient and the patient's personality, to encourage their friends to support the patient. For example, supporters described in campaign promotions that Olivia's parents are the nicest couple they know, so they encourage more people to support Olivia. The other type of shared history, common activity, is found in pictures of supporters that come together writing cards to Olivia and their family in the hospital and a group of supporters participating in a fundraising event. In the Community Journey interface, these messages and

pictures highlighting the shared emotional connections are presented in the support activity section (Figure 7.2-c).

7.2.4 Survey Study

I conducted the between-subjects online survey study to evaluate the impact of the Community journey interface on feeling a sense of community and contribution behaviors. For this survey study, I created an online platform where participants are randomly assigned either to the control interface or the experimental interface of Community Journey. Both the control and experimental interfaces were fully functional, so participants could explore Olivia's campaign as if they explore an online campaign in the real life. After trying the assigned interface version, participants were asked their willingness to contribute and feeling a sense of community. After completing the survey, participants entered their email address to receive either \$5 Amazon gift card or cash via Paypal. In addition, I told that one out of 50 participants will be randomly selected to receive an additional \$50 bonus prize. This prize enabled us to study participants' decision on how much to donate to Olivia's medical crowdfunding campaign.

Participants

I recruited participants by posting the survey link to Facebook groups and sending emails to campus-wide mailing lists for faculty, university staff, and student communities. A total 130 participants completed the survey remotely. Among 130 participants I removed 5 participants who has failed both of the screening questions.

The participants consisted of 82 women (66%) and 12 men (43%) ranging between 19 and 63 years old, with a mean and median of 34.

Survey Content

The survey consists of five sections: 1) the medical crowdfunding campaign exploration, 2) asking willingness to contribute, 3) asking the interface influence on their willingness to contribute, 4) the sense of community survey, and 5) asking the interface influence on sympathy. The details of each section are described below.

The Medical Crowdfunding Campaign Exploration started with asking participants to imagine that one of their friends shared a link to a GoFundMe campaign on their Facebook

NewsFeed to ask for support. Then, participants were asked to explore the campaign on the next page of the survey.

I randomly showed either the Community Journey interface or the Existing Crowdfunding interface to participants. To ensure that participants explored the core interface features of either the control or experimental interface – campaign title, updates, and the support activity section – I built a tooltips that walkthrough each interface feature and describes about the feature. Once participants completed the campaign feature exploration using tooltips, I asked them to spend more time to closely read all the information described on the campaign and decide whether and how they would support this campaign. To check whether participants read all the information and tried all the features, I included three verification questions about the campaign story, updates, and support messages written on the campaign.

Willingness to Contribute (5 items, $\alpha=0.63$) was measured by asking “*How likely would you be to make each of the following types of contribution to this campaign?*” For each type of contribution – making a monetary donation, sharing the campaign, writing a message on the campaign, and making an offline contribution – I asked participants to rate their willingness to support on a 7-point likert scale ranging from 1: Very Unlikely to 7: Very Likely. Finally, I asked participants how much they would want to donate to Olivia’s campaign if they are selected for the additional \$50 prize.

Influences of the Interface Features on Contributions (3 items, $\alpha=0.82$) were measured using a 7-point agreement likert scale ranging from 1: Strongly Disagree to 7: Strongly Agree for the questions such as “*Reading Olivia’s medical progress on the Updates section made me want to contribute.*” When the questions are asked, I showed the update section interface to remind them of the interface design.

A Sense of Community (12 items, $\alpha=0.89$) includes the four construct measures of a sense of community. For example, the questions measuring the *influence* construct included “*I will care about what other members in this group think of my actions.*” The questions measuring the *need of fulfillment* construct included “*This group will be a good place for me to be a member.*” The questions measuring the shared emotional connection construct included “*Members in this group generally get along with one another.*” The questions measuring the membership construct included “*I expect to feel at home in this group.*”

Table 7.1: Descriptive statistics for the sense of community measures comparing the experiment condition – Community Journey (N=65) and the control condition – Existing Crowdfunding (N=65).

| | Experiment Mean | Control Mean | P value |
|--|------------------------|---------------------|--------------------|
| Sense of Community ($\alpha = 0.89$) | 3.77 | 3.09 | < 0.001 *** |
| Membership | 3.93 | 2.63 | < 0.001 *** |
| Need of Fulfillment | 4.38 | 3.87 | < 0.05 * |
| Influence | 2.77 | 2.40 | 0.11 |
| Emotion | 4.00 | 3.44 | < 0.01 ** |

Influences of the Interface Features on Sympathy (3 items, $\alpha=0.79$) were measured using a 7-point agreement likert scale ranging from 1: Strongly Disagree to 7: Strongly Agree. For the control condition interface, questions such as “*Seeing donations from many supporters led me to sympathize with the cause*” are asked. Because I added non-monetary contributions added to the Community Journey interface, for the Community Journey condition, questions such as “*Seeing various types of support activities (promotions, offline support, and messages) from many team members in addition to monetary donations led me to sympathize with the cause*” are asked.

Survey Analysis

For the contribution scale, I averaged all the values for donations, shares, messages, offline support, and actual donation amount to a single value to represent the contribution. The actual donation amount was normalized (from 1 to 7) to match the scale of other contribution elements.

For sense of community scale, I averaged all the values of survey elements and reported as a single value. I then averaged all the values belongs to each construct to further understand which construct has shown most significant differences between the Community Journey and the control interface conditions.

7.3 SURVEY RESULTS

This section reports the survey results. I first report a sense of community results and then willingness to contribute.

Table 7.2: Descriptive statistics for the contribution measures comparing the experiment condition – Community Journey (N=65) and the control condition – Existing Crowdfunding (N=65).

| | Experiment Mean | Control Mean | P value |
|---|------------------------|---------------------|---------------------|
| Overall Contributions ($\alpha = 0.63$) | 2.94 | 3.46 | < 0.05 * |
| Donate | 3.22 | 3.60 | 0.251 |
| Share | 2.55 | 3.60 | < 0.01 ** |
| Message | 2.10 | 2.81 | < 0.05 * |
| Offline | 3.18 | 3.10 | 0.83 |
| Cash | 3.64 | 4.17 | 0.21 |

7.3.1 A Sense of Community

The participants felt a significantly higher level of a sense of community in the Community Journey condition ($p < 0.001$) than the control condition (see Table 7.1). Among the four constructs, only the influence construct was not statically significant between the two conditions. Participants also reported that all three interface-features – the update section, the support activity section, and the interaction between the update and support activity sections – significantly increased their sympathy toward the Olivia’s cause ($p < 0.001$).

In the comments, participants explained that seeing diverse community support and seeing people caring for Olivia made them want to be part of the community. For example, one participant described, *”because I enjoy seeing people care for others, I like to be part of a supportive community.”* Another participant said, *”sending offline help like gifts and cards showed that folks cared about this family beyond financial measures.”*

7.3.2 Contributions

The participants were more willing to contribute in the Community Journey condition ($p < 0.05$) than the control condition. More specifically, people were significantly more willing to share a campaign ($p < 0.01$) and write a message ($p < 0.05$) on the Community Journey condition than the control condition. However, their willingness to donate money, provide offline contributions, and actual donation amount did not show any significant difference between two conditions.

The sense of community model suggests that feeling a more sense of community can encourage participation. So I conducted mediation analysis to further probe how much of the variance in willingness to donate flows through a sense of community. Since I have multiple dependent variables and multi-item scales for the sense of community construct, I conducted

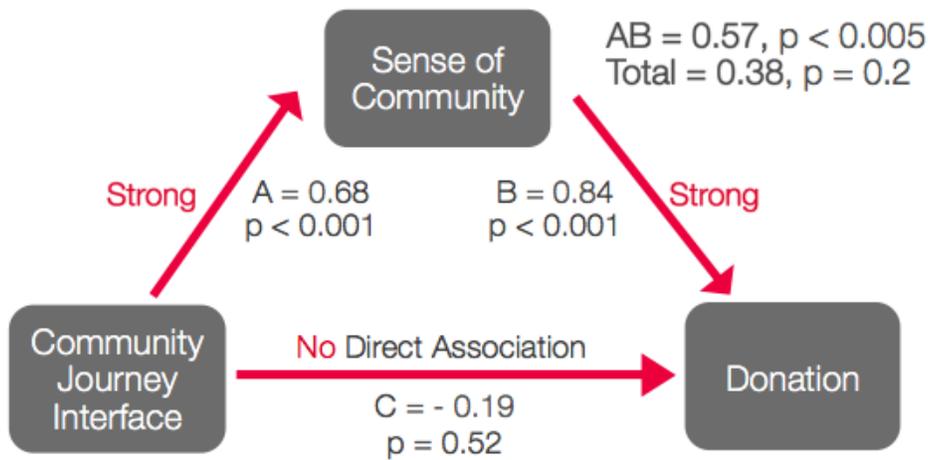


Figure 7.3: Mediation analysis of the relationship between the Community Journey interface and donations through the sense of community.

mediation analysis using structural equation modeling. The mediation analysis results (see Figure 7.3) revealed that a direct association between the Community Journey condition and willingness to donate was not significantly strong ($p = 0.52$). However, there was a significant association between the Community Journey interface and the sense of community ($p < 0.001$) as well as a significant association between the sense of community and willingness to donate ($p < 0.001$). Therefore, the Community Journey interface was associated with willingness to donate indirectly through increases in feeling a sense of community. This results suggest that our interface can eventually increase donations if we emphasize a more sense of community in the interface.

In the comments, participants mentioned that feeling a strong sense of community as a reason for wanting to contribute in the community journey interface. For example, a participant described, *"since many people love this family, it makes me think that they are more than worthy to receive money."* Another participant commented that *"The pictures of people grouped together made me want to contribute because I see so much support from others."*

7.3.3 Privacy & Ethical Considerations

I faced several ethical challenges when choosing a medical crowdfunding campaign that will be used in a between-subjects online survey. We had to consider trade-offs between protecting the patient privacy and ensuring the validity of our study. For example, to ensure the study

validity, it is important to use an authentic crowdfunding campaign publicly available on crowdfunding sites. However, it was challenging to recruit medical crowdfunding patients who would allow us to use their crowdfunding campaign in our survey. Although medical crowdfunding campaigns are publicly available, using those campaigns in the study purpose can raise ethical concerns. We therefore decided to anonymize the patient's identity by replacing the patient's picture with publicly available pictures on the Internet, changing the patient's names, and changing names of the patient's supporters. We made this decision because we valued the patient's privacy as a priority.

CHAPTER 8: CONCLUSIONS & FUTURE WORK

This dissertation showed that collective endorsements can establish the credibility of medical crowdfunding patients (Chapter 3), but they are not visible to everyone associated with medical crowdfunding campaigns – medical crowdfunding patients, supporters, and potential supporters (Chapter 4). By making collective endorsements visible, I showed that collective endorsements can promote collaboration (Chapter 5), communicate rich stories about the patients (Chapter 6), and increase strangers’ participation (Chapter 7) on medical crowdfunding campaigns. In this chapter, I conclude this thesis by revisiting each finding and outline some of the major results and future works.

1. We can use collective endorsements to establish the credibility of medical stories shared in various online sites.

The collective endorsements presented in Chapter 3 showed that people’s support activities around the patient can help strangers evaluate the credibility of the patient’s medical crowdfunding story. Traditional approaches of assessing the credibility of online contents focused on evaluating the author’s expertise or content’s professionalism. However, a medical crowdfunding story’s credibility is evaluated through collective endorsements: what people say and do around the patient. For example, when supporters shared the patient’s story on social media to ask others for support, they described the patient’s personality (e.g., “*most loyal and fun-loving person*”) or their membership in organizations (e.g., “*our member from a dance club*”). This evidence that supporters provide established the credibility of the patient’s story and collectively signal that a patient is worthy of support.

Going beyond medical crowdfunding, the uses of collective endorsements can be found in many other domains such as online reviews or social media shares of news articles about a certain political figure. Because these collective endorsements are everywhere, many people believe them. However, nowadays, some people fabricate these collective endorsements using automated social media accounts. Especially in the United States 2016 presidential election, Twitter bots intentionally fabricated collective endorsements by spreading malicious contents about a particular figure. The next step of research should examine ways to discover and inform users the fabricated collective endorsements in their everyday uses of social media. Existing research investigates ways to detect these automated social media accounts using machine learning. Building on this existing research, we could create web interfaces that can help users be aware of these suspicious social media accounts and their behaviors on everyday uses of social media. Interfaces that illustrate why algorithms predict the account

or information suspicious could help people develop ability to better evaluate the credibility of information they read on social media. Thus, in future research, we should examine ways to design against fabricated collective endorsements.

2. We can use collective endorsements to promote community and storytelling.

In Chapter 5 and 6, I explored the design space that can make collective endorsement visible. By evaluating three different prototypes that each highlight detailed contents, impact, and opportunities of community support, I discovered that presenting detailed support contents helped supporters infer common connections to the beneficiary. Furthermore, showing a diverse support opportunities helped supporters and potential supporters become aware of more support opportunities that they can participate.

However, questions remain for future research. We should consider privacy issues that both supporters and patients might face when making their social media shares and offline support visible on a public medical crowdfunding interface. How much details of support activities should we reveal in public space? Perhaps supporters can control what to display for their support. It is also important to give patients the capability to add and remove the non-monetary support to resolve potential problems. Furthermore, the medical crowdfunding interface incorporating non-monetary support might not be effective for patients who have few non-monetary supporters. They might feel more discouraged about having fewer supporters than other patients [17]. We need to find better ways to support those patients who may lack friends or family to provide non-monetary support.

3. We can use collective endorsements to increase participation.

Chapter 7 presented Community Journey, a crowdfunding interface that promotes strangers' sense of community and participation to online crowdfunding campaigns. In this chapter, I showed highlighting four elements of sense of community model—membership, fulfillment of needs, influence, and emotional connections—on a crowdfunding interface made strangers feel a significantly higher level of sense of community and significantly more willing to contribute to the patient support crowdfunding community.

These findings can be generalized and applied to other domains such as family caregiving. Caregiving requires extensive time and effort, especially for people with neurological disorders such as dementia, autism, and Alzheimer's. However, typically only a few family members take responsibility for the caregiving [88]. How can we encourage more caregivers' voluntary participation? How can we strengthen caregivers' emotional connections through

caregiving?

In conclusion, my thesis introduced the concept of collective endorsements and showed that they can promote credibility, belonging, and participation in medical support communities; bridge together online and offline support communities; and become elements of the patient story. I believe this work will better inform HCI researchers to design more supportive and trustworthy sociotechnical systems for a wide range of medical support communities.

REFERENCES

- [1] G. Burtch, A. Ghose, and S. Wattal, “Cultural Differences and Geography As Determinants of Online Pro-Social Lending,” *MIS Quarterly*, vol. 1, pp. 1–44, 2014.
- [2] J. Huh, R. Patel, and W. Pratt, “Tackling Dilemmas in Supporting ”The Whole Person” in Online Patient Communities.” in *Proc. CHI 2012*, 2012. [Online]. Available: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3949736{\&}tool=pmcentrez{\&}rendertype=abstract> pp. 923–926.
- [3] J. Huh and M. S. Ackerman, “Collaborative Help in Chronic Disease Management: Supporting Individualized Problems.” *Proc. CSCW 2012*, pp. 853–862, 2012. [Online]. Available: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4211623{\&}tool=pmcentrez{\&}rendertype=abstract>
- [4] M. W. Newman, D. Lauterbach, S. a. Munson, P. Resnick, and M. E. Morris, “It’ s not that I don’t have problems , I’m just not putting them on Facebook: Challenges and Opportunities in,” *Proc. CSCW 2011*, pp. 341–350, 2011.
- [5] J. R. Brubaker, C. Lustig, and G. R. Hayes, “PatientsLikeMe : Empowerment and Representation in a Patient-Centered Social Network,” *CSCW Research in Healthcare: Past, Present, and Future*, pp. 715–22, 2010. [Online]. Available: http://www.gillianhayes.com/wp-content/uploads/2011/01/CnP11{_}PatientsLikeme.pdf
- [6] I. K. Anderson, “The uses and gratifications of online care pages: a study of CaringBridge.” *Health communication*, vol. 26, no. 6, pp. 546–59, 2011. [Online]. Available: <http://www.ncbi.nlm.nih.gov/pubmed/21469004>
- [7] D. Wang, J. S. Olson, J. Zhang, T. Nguyen, and G. M. Olson, “DocuViz: Visualizing Collaborative Writing,” *In Proc. CHI 2015*, vol. 1, pp. 1865–1874, 2015. [Online]. Available: <http://dx.doi.org/10.1145/2702123.2702517>
- [8] M. M. Skeels, K. T. Unruh, C. Powell, and W. Pratt, “Catalyzing social support for breast cancer patients,” in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 2010, pp. 173–182.
- [9] J. Kim, A. Gambino, S. S. Sundar, M. B. Rosson, C. Aritajati, J. Ge, and C. Fanning, “Interface cues to promote disclosure and build community: An experimental test of crowd and connectivity cues in an online sexual health forum,” *Proceedings of the ACM on Human-Computer Interaction*, vol. 2, no. CSCW, p. 90, 2018.
- [10] D. Yang, R. Kraut, and J. M. Levine, “Commitment of newcomers and old-timers to online health support communities,” in *Proceedings of the 2017 CHI conference on human factors in computing systems*. ACM, 2017, pp. 6363–6375.

- [11] L. S. Liu, S. H. Hirano, M. Tentori, K. G. Cheng, S. George, S. Y. Park, and G. R. Hayes, “Improving communication and social support for caregivers of high-risk infants through mobile technologies,” *Proceedings of the ACM 2011 conference on Computer supported cooperative work - CSCW '11*, p. 475, 2011. [Online]. Available: <http://portal.acm.org/citation.cfm?doid=1958824.1958897>
- [12] G. A. Dakof and S. E. Taylor, “Victims’ perceptions of social support: what is helpful from whom?” *Journal of personality and social psychology*, vol. 58, no. 1, pp. 80–89, 1990.
- [13] Y. Ren, F. M. Harper, S. Drenner, L. Terveen, S. Kiesler, J. Riedl, and R. E. Kraut, “Building member attachment in online communities: Applying theories of group identity and interpersonal bonds,” *Mis Quarterly*, pp. 841–864, 2012.
- [14] R. Farzan, L. A. Dabbish, R. E. Kraut, and T. Postmes, “Increasing commitment to online communities by designing for social presence,” in *Proceedings of the ACM 2011 conference on Computer supported cooperative work*. ACM, 2011, pp. 321–330.
- [15] D. W. McMillan and D. M. Chavis, “Sense of community: A definition and theory,” *Journal of community psychology*, vol. 14, no. 1, pp. 6–23, 1986.
- [16] M. D. Greenberg and E. M. Gerber, “Learning to Fail: Experiencing Public Failure Online Through Crowdfunding,” in *Proc. CHI 2014*. ACM Press, 2014, pp. 581–590.
- [17] J. G. Kim, K. Vaccaro, K. Karahalios, and H. Hong, “Not by Money Alone : Social Support Opportunities in Medical Crowdfunding Campaigns,” in *Proc. CSCW 2017*, 2017.
- [18] E. M. Gerber and J. Hui, “Crowdfunding : Motivations and Deterrents for Participation,” *ACM Transactions on Computer-Human Interaction*, vol. 20, no. 6, p. 32, 2013.
- [19] E. Mollick, “The dynamics of crowdfunding: An exploratory study,” *Journal of Business Venturing*, vol. 29, pp. 1–16, 2014.
- [20] A. Xu, X. Yang, H. Rao, W.-t. Fu, S.-w. Huang, and B. P. Bailey, “Show Me the Money! An Analysis of Project Updates during Crowdfunding Campaigns,” in *Proc. CHI 2014*, 2014, pp. 591–600.
- [21] J. Solomon, W. Ma, and R. Wash, “Don’t Wait! How Timing Affects Coordination of Crowdfunding Donations,” *Proc. CSCW 2015*, pp. 547–556, 2015.
- [22] Y. Mejova, I. Weber, M. C. Dougal, and B. Hall, “Giving is Caring : Understanding Donation Behavior through Email,” *Proc. CSCW 2014*, pp. 1297–1307, 2014.
- [23] J. G. Kim, S. Park, K. Karahalios, and M. Twidale, “Labor Saving and Labor Making of Value in Online Congratulatory Messages,” in *Proc. SocInfo 2015*, 2015.

- [24] S. Smith, F. Windmeijer, and E. Wright, “Peer effects in charitable giving: Evidence from the (running) field,” *Economic Journal*, vol. 125, pp. 1053–1071, 2014.
- [25] K. G. Tanaka and A. Volda, “Legitimacy Work : Invisible Work in Philanthropic Crowdfunding,” in *Proc. CHI 2016*, 2016.
- [26] T. Mitra and E. Gilbert, “The Language that Gets People to Give: Phrases that Predict Success on Kickstarter,” *CSCW conf.*, pp. 49–61, 2014. [Online]. Available: <http://diyhopl.us/~bryan/papers2/paperbot/537c4cb93e3047f7a1c9884bf68df195.pdf>
- [27] J. S. Hui, M. D. Greenberg, and E. M. Gerber, “Understanding the role of community in crowdfunding work,” in *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing*. ACM, 2014, pp. 62–74.
- [28] J. G. Kim, H. K. Kong, K. Karahalios, W.-t. Fu, and H. Hong, “The Power of Collective Endorsements : Credibility Factors in Medical Crowdfunding Campaigns,” in *Proc. CHI 2016*, 2016.
- [29] T. Althoff and J. Leskovec, “Donor Retention in Online Crowdfunding Communities : A Case Study of DonorsChoose.org,” in *Proc. WWW 2015*, 2015, pp. 34–44.
- [30] V. Rakesh, J. Choo, and C. Reddy, “Project Recommendation Using Heterogeneous Traits in Crowdfunding,” in *Proc. ICSWM 2015*, 2015.
- [31] S. Dey, B. Duff, and K. Karahalios, “The Art and Science of Persuasion : Not All Crowdfunding Campaign Videos Are The Same Predictors of Crowdfunding Success,” in *Proc. CSCW 2017*, 2017.
- [32] M. De Choudhury and S. De, “Mental Health Discourse on reddit: Self-Disclosure, Social Support, and Anonymity,” *Proc. ICSWM 2014*, pp. 71–80, 2014.
- [33] R. M. Carpiano, “Toward a neighborhood resource-based theory of social capital for health: Can Bourdieu and sociology help?” *Social Science and Medicine*, vol. 62, no. 1, pp. 165–175, 2006.
- [34] S. Cohen, “Social relationships and health.” *The American psychologist*, vol. 59, no. 8, pp. 676–684, 2004.
- [35] J. Chronister, E. Johnson, and N. Berven, “Measuring social support in rehabilitation,” *Disability and Rehabilitation*, vol. 28, no. 2, pp. 75–84, 2006. [Online]. Available: <http://www.ncbi.nlm.nih.gov/pubmed/16393837>
- [36] J. Huh and W. Pratt, “Weaving clinical expertise in online health communities,” in *Proc. CHI 2014*, 2014. [Online]. Available: <http://dl.acm.org/citation.cfm?doi=2556288.2557293> pp. 1355–1364.
- [37] Y.-c. Wang, R. Kraut, and J. M. Levine, “To Stay or Leave? The Relationship of Emotional and Informational Support to Commitment in Online Health Support Groups,” *Proc. CSCW 2012*, pp. 833–842, 2012.

- [38] T. Vlahovic, Y.-C. Wang, R. Kraut, and J. Levine, “Support matching and satisfaction in an online breast cancer support community,” *Proc. CHI 2014*, pp. 1625–1634, 2014. [Online]. Available: <http://dl.acm.org.proxy2.cl.msu.edu/citation.cfm?id=2556288.2557108>
- [39] “CaringBridge.” [Online]. Available: www.caringbridge.org
- [40] “Lotsa Helping Hands: How to Help the Community and Provide Caregiver Support,” pp. <http://lotsahelpinghands.com/how-it-works/>.
- [41] “Compassion.” [Online]. Available: <http://www.compassion.com/>
- [42] S. Hwang, “The effect of charitable giving by celebrities on the personal public relations,” *Public Relations Review*, vol. 36, no. 3, pp. 313–315, 2010. [Online]. Available: <http://dx.doi.org/10.1016/j.pubrev.2010.04.010>
- [43] “Better Business Wise Giving Alliance.” [Online]. Available: www.give.org
- [44] M. Gibelman and S. R. Gelman, “A loss of credibility: Patterns of wrongdoing among nongovernmental organizations,” *International Journal of Voluntary and Nonprofit Organizations*, vol. 15, no. 4, pp. 355–381, 2004.
- [45] B. J. Fogg, J. Marshall, O. Laraki, A. Osipovich, C. Varma, N. Fang, J. Paul, A. Rangnekar, J. Shon, P. Swani, M. Treinen, and C. Hall, “What Makes Web Sites Credible ? A Report on a Large Quantitative Study,” in *Proc. CHI 2001*, 2001, pp. 61–68.
- [46] B. J. Fogg, C. Soohoo, D. R. Danielson, L. Marable, J. Stanford, and E. R. Tauber, “How do users evaluate the credibility of Web sites?” in *Proc. DUX 2003*. ACM Press, 2003. [Online]. Available: <http://dl.acm.org/citation.cfm?id=997078.997097> pp. 1–15.
- [47] M. J. Metzger, “Making sense of credibility on the Web: Models for evaluating online information and recommendations for future research,” *Journal of the American Society for Information Science and Technology*, vol. 58, no. 13, pp. 2078–2091, 2007.
- [48] M. R. Morris, S. Counts, A. Roseway, A. Hoff, and J. Schwarz, “Tweeting is Believing? Understanding Microblog Credibility Perceptions Meredith,” in *Proc. CSCW 2012*. ACM Press, 2012. [Online]. Available: <http://dl.acm.org/citation.cfm?id=2145204.2145274> pp. 441–450.
- [49] P. Pirolli, E. Wollny, and B. Suh, “So You Know You’re Getting the Best Possible Information: A Tool that Increases Wikipedia Credibility,” in *Proc. CHI 2009*. ACM Press, 2009. [Online]. Available: <https://dl.acm.org/citation.cfm?id=1518701.1518929{\&}coll=DL{\&}dl=ACM{\&}CFID=39914425{\&}CFTOKEN=69014028> pp. 1505–1508.

- [50] A. Kittur, B. Suh, E. H. Chi, and P. Alto, “Can You Ever Trust a Wiki ? Impacting Perceived Trustworthiness in Wikipedia,” in *Proc. CSCW 2008*. ACM Press, 2008, pp. 7–10.
- [51] T. Erickson, C. Halverson, W. A. Kellogg, M. Laff, and T. Wolf, “Social translucence: designing social infrastructures that make collective activity visible,” *Communications of the ACM*, vol. 45, no. 4, pp. 40–44, 2002.
- [52] G. Hsieh, K. P. Tang, W. Y. Low, and J. I. Hong, “Field Deployment of IMBuddy : A Study of Privacy Control and Feedback Mechanisms for Contextual IM,” *Proc. Ubicomp 2007*, pp. 91–108, 2007.
- [53] J. Hancock, J. Birnholtz, N. Bazarova, J. Guillory, J. Perlin, and B. Amos, “Butler Lies: Awareness, Deception, and Design,” in *Proc. CHI 2009*, 2009.
- [54] T. Erickson, W. A. Kellogg, and I. B. M. T. J. Watson, “Social Translucence : An Approach to Designing Systems that Support Social Processes,” *ACM Transactions on Computer-Human Interaction*, vol. 7, no. 1, pp. 59–83, 2000.
- [55] L. Dabbish, C. Stuart, J. Tsay, and J. Herbsleb, “Social Coding in GitHub: Transparency and Collaboration in an Open Software Repository,” in *Proc. CSCW 2012*, 2012, pp. 1277–1286.
- [56] E. Gilbert, “Designing social translucence over social networks,” *Proc. CHI 2012*, pp. 2731–2740, 2012. [Online]. Available: <http://doi.acm.org/10.1145/2207676.2208670>
[http://dl.acm.org/ft_gateway.cfm?id=2208670](http://dl.acm.org/ft_gateway.cfm?id=2208670&type=pdf)
<http://dl.acm.org/citation.cfm?id=2208670>
- [57] S. L. Star and A. Strauss, “Layers of Silence, Arenas of Voice: The Ecology of Visible and Invisible Work,” *Computer Supported Cooperative Work*, vol. 8, no. 1995, pp. 8–30, 1999.
- [58] H. C. Stuart, L. Dabbish, S. Kiesler, P. Kinnaird, and R. Kang, “Social Transparency in Networked Information Exchange : A Framework and Research Question,” *Proc. CSCW 2012*, pp. 451–460, 2012. [Online]. Available: <http://doi.acm.org/10.1145/2145204.2145275>
- [59] L. Suchman, “Making Work Visible,” *Communications of the ACM*, vol. 38, no. 9, pp. 56–64, 1995.
- [60] B. Suh, E. H. Chi, A. Kittur, and B. a. Pendleton, “Lifting the veil: improving accountability and social transparency in Wikipedia with wikidashboard,” *Proc. CHI 2008*, vol. 4, no. 1, pp. 1037–1040, 2008. [Online]. Available: <http://portal.acm.org/citation.cfm?id=1357214>
- [61] T. C. Turner, M. A. Smith, D. Fisher, and H. T. Welser, “Picturing usenet: Mapping computer-mediated collective action,” *Journal of Computer-Mediated Communication*, vol. 10, no. 4, p. JCMC1048, 2005.

- [62] F. Viegas, D. Boyd, D. Nguyen, J. Potter, and J. Donath, “Digital artifacts for remembering and storytelling: posthistory and social network fragments,” *In Proc. HICSS 2004*, 2004. [Online]. Available: <http://ieeexplore.ieee.org/document/1265287/>
- [63] F. B. Viégas and M. Smith, “Newsgroup Crowds and AuthorLines: Visualizing the Activity of Individuals in Conversational Cyberspaces,” in *Proc. HICSS 04*, 2004, pp. 1–10.
- [64] F. Viégas and M. Wattenberg, “Google+ ripples: A native visualization of information flow,” *Proc. WWW 2013*, pp. 1389–1398, 2013.
- [65] F. B. Viégas and M. Smith, “Newsgroup crowds and authorlines: Visualizing the activity of individuals in conversational cyberspaces,” in *System Sciences, 2004. Proceedings of the 37th Annual Hawaii International Conference on*. IEEE, 2004, pp. 10–pp.
- [66] F. B. Viégas, M. Wattenberg, and K. Dave, “Studying cooperation and conflict between authors with history flow visualizations,” in *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 2004, pp. 575–582.
- [67] M. Ananny and K. Crawford, “Seeing without knowing: Limitations of the transparency ideal and its application to algorithmic accountability,” *new media & society*, p. 1461444816676645, 2016.
- [68] J. Donath, K. Karahalios, and F. Viegas, “Visualizing conversation,” *Journal of computer-mediated communication*, vol. 4, no. 4, p. JCMC442, 1999.
- [69] J. Marlow and L. Dabbish, “Activity Traces and Signals in Software Developer Recruitment and Hiring,” in *Proc. CSCW 2013*, 2013, pp. 145–155.
- [70] E. Gilbert and K. Karahalios, “Codesaw: A social visualization of distributed software development,” in *IFIP Conference on Human-Computer Interaction*. Springer, 2007, pp. 303–316.
- [71] J. Marlow, L. Dabbish, and J. Herbsleb, “Impression Formation in Online Peer Production : Activity Traces and Personal Profiles in GitHub,” in *Proc. CSCW 2013*, 2013, pp. 117–128.
- [72] S. Rodgers and Q. Chen, “Internet community group participation: Psychosocial benefits for women with breast cancer,” *Journal of Computer-Mediated Communication*, vol. 10, no. 4, p. JCMC1047, 2005.
- [73] S. Dey, K. Karahalios, and W.-T. Fu, “Effects of socially stigmatized crowdfunding campaigns in shaping opinions,” in *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, 2018, p. 242.
- [74] W. A. Hamilton, O. Garretson, and A. Kerne, “Streaming on twitch: fostering participatory communities of play within live mixed media,” in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 2014, pp. 1315–1324.

- [75] Y.-C. Hsu, P. Dille, J. Cross, B. Dias, R. Sargent, and I. Nourbakhsh, “Community-empowered air quality monitoring system,” in *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. ACM, 2017, pp. 1607–1619.
- [76] M. Maruyama, S. P. Robertson, S. Douglas, R. Raine, and B. Semaan, “Social watching a civic broadcast: Understanding the effects of positive feedback and other users’ opinions,” in *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing*. ACM, 2017, pp. 794–807.
- [77] N. Sun, M. B. Rosson, and J. M. Carroll, “Where is community among online learners?: Identity, efficacy and personal ties,” in *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, 2018, p. 292.
- [78] H. Du, M. B. Rosson, J. M. Carroll, and C. Ganoë, “I felt like a contributing member of the class: increasing class participation with classcommons,” in *Proceedings of the ACM 2009 international conference on Supporting group work*. ACM, 2009, pp. 233–242.
- [79] D. Thomas, “A General Inductive Approach for Analyzing Qualitative Evaluation Data,” *American Journal of Evaluation*, vol. 27, no. 2, pp. 237–246, 2006.
- [80] “Nvivo Tool.” [Online]. Available: <http://www.qsrinternational.com>
- [81] D. Warkentin, M. Woodworth, J. T. Hancock, and N. Cormier, “Warrants and deception in computer mediated communication,” in *Proc. CSCW 2010*. ACM Press, 2010. [Online]. Available: <http://portal.acm.org/citation.cfm?doid=1718918.1718922> pp. 9–12.
- [82] Q. Du, Z. Qiao, W. Fan, M. Zhou, X. Zhang, and A. G. Wang, “Money Talks : A Predictive Model on Crowdfunding Success Using Project Description,” in *Proc. ACIS 2015*, vol. 1, 2015, pp. 1–8.
- [83] J. S. Hui, E. M. Gerber, and D. Gergle, “Understanding and Leveraging Social Networks for Crowdfunding: Opportunities and Challenges,” in *Proc. DIS 2014*. ACM Press, 2014. [Online]. Available: http://collablab.northwestern.edu/pubs/DIS2014{_}_HuiGerberGergle.pdf pp. 2083–2088.
- [84] S. Y. Rieh, “Judgment of information quality and cognitive authority in the Web,” *Journal of the American Society for Information Science and Technology*, vol. 53, no. 2, pp. 145–161, 2002.
- [85] J. M. Rzeszutarski and M. R. Morris, “Estimating the Social Costs of Friendsourcing,” in *Proc. CHI 2014*, 2014. [Online]. Available: <http://dl.acm.org/citation.cfm?doid=2556288.2557181> pp. 2735–2744.
- [86] P. Bourdieu, *The Forms of Capital*, G. E. Richardson, J., Ed. New York: Greenwood Press, 1986.

- [87] M. Burke and R. Kraut, “Social Capital on Facebook : Differentiating Uses and Users,” *Proc. CHI 2011*, pp. 571–580, 2011.
- [88] A. Barbarin and T. C. Veinot, “Taking Our Time: Chronic Illness and Time-Based Objects in Families,” in *Proc. CSCW 2015*, 2015, pp. 288–301.
- [89] M. S. Bernstein, E. Bakshy, M. Burke, B. Karrer, and M. Park, “Quantifying the invisible audience in social networks,” in *Proc. CHI 2013*, 2013, pp. 21–30.
- [90] M. Eslami, A. Rickman, K. Vaccaro, A. Aleyasen, A. Vuong, K. Karahalios, K. Hamilton, and C. Sandvig, “”I always assumed that I wasn’t really that close to [her]”,” in *Proc. CHI 2015*, 2015. [Online]. Available: <http://dl.acm.org/citation.cfm?doid=2702123.2702556> pp. 153–162.
- [91] W. Harbaugh, “The prestige motive for making charitable transfers,” *American Economic Review, Papers and Proceedings*, vol. 88, no. 2, pp. 277–82, 1998.
- [92] J. M. DiMicco and D. R. Millen, “Identity Management: Multiple Presentations of Self in Facebook,” in *Proc. Group 2007*, 2007.
- [93] X. Zhao, N. Salehi, S. Naranjit, S. Alwaalan, S. Voids, and D. Cosley, “The Many Faces of Facebook : Experiencing Social Media as Performance, Exhibition, and Personal Archive,” *Proc. CHI 2013*, pp. 1–10, 2013.
- [94] K. Derthick, P. Tsao, T. Kriplean, A. Borning, M. Zachry, and D. W. McDonald, “Collaborative Sensemaking during Admin Permission Granting in Wikipedia,” in *Proc. OCSC 2011*, 2011, pp. 100–109.
- [95] L. Mamykina, A. D. Miller, E. D. Mynatt, and D. Greenblatt, “Constructing Identities through Storytelling in Diabetes Management,” in *Proc. CHI 2010*, 2010, pp. 1203–1212.
- [96] A. L. Gonzales, E. Y. Kwon, T. Lynch, and N. Fritz, “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*, 2016.
- [97] D. A. Epstein, B. H. Jacobson, E. Bales, D. W. McDonald, and S. A. Munson, “From ”nobody cares” to ”way to go!”,” *Proc. CSCW 2015*, pp. 1622–1636, 2015. [Online]. Available: <http://dl.acm.org/citation.cfm?id=2675133.2675135>
- [98] C. A. Lampe, N. Ellison, and C. Steinfield, “A familiar face (book): profile elements as signals in an online social network,” in *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 2007, pp. 435–444.
- [99] L. M. Hamel and H. C. Shulman, “Self-Generated Versus Other-Generated Statements and Impressions in Computer-Mediated Communication,” *Communication Research*, pp. 229–253, 2009.

- [100] J. G. Kim, H. Hong, and K. Karahalios, “Understanding Identity Presentation in Medical Crowdfunding,” *In Proc. CHI 2018*, 2018.
- [101] J. Mackinlay, P. Hanrahan, and C. Stolte, “Show me: Automatic presentation for visual analysis,” *IEEE transactions on visualization and computer graphics*, vol. 13, no. 6, pp. 1137–1144, 2007.
- [102] J. Mackinlay, “Automating the design of graphical presentations of relational information,” *Acm Transactions On Graphics (Tog)*, vol. 5, no. 2, pp. 110–141, 1986.
- [103] M. Bostock and J. Heer, “Protovis: A graphical toolkit for visualization,” *IEEE transactions on visualization and computer graphics*, vol. 15, no. 6, pp. 1121–1128, 2009.
- [104] D. Boyd, H.-Y. Lee, D. Ramage, and J. Donath, “Developing legible visualizations for online social spaces,” in *System Sciences, 2002. HICSS. Proceedings of the 35th Annual Hawaii International Conference on*. IEEE, 2002, pp. 1060–1069.
- [105] H. Hutchinson, W. Mackay, B. Westerlund, B. B. Bederson, A. Druin, C. Plaisant, M. Beaudouin-Lafon, S. Conversy, H. Evans, H. Hansen et al., “Technology probes: inspiring design for and with families,” in *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 2003, pp. 17–24.
- [106] C. Cobb, T. McCarthy, A. Perkins, A. Bharadwaj, J. Comis, B. Do, and K. Starbird, “Designing for the deluge: understanding & supporting the distributed, collaborative work of crisis volunteers,” in *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing*. ACM, 2014, pp. 888–899.
- [107] E. Gilbert, “Phrases that signal workplace hierarchy,” *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work - CSCW '12*, p. 1037, 2012. [Online]. Available: <http://dl.acm.org/citation.cfm?doid=2145204.2145359>
- [108] K. Starbird and L. Palen, “Voluntweeters: Self-organizing by digital volunteers in times of crisis,” in *Proceedings of the SIGCHI conference on human factors in computing systems*. ACM, 2011, pp. 1071–1080.
- [109] K. Starbird, “Delivering patients to sacré coeur: collective intelligence in digital volunteer communities,” in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 2013, pp. 801–810.
- [110] J. Goecks, A. Volda, S. Volda, and E. D. Mynatt, “Charitable technologies: Opportunities for collaborative computing in nonprofit fundraising,” in *Proceedings of the 2008 ACM conference on Computer supported cooperative work*. ACM, 2008, pp. 689–698.
- [111] Y. Kim, A. D. Shaw, H. Zhang, and E. Gerber, “Understanding trust amid delays in crowdfunding.” in *CSCW*, 2017, pp. 1982–1996.
- [112] E. Goffman, *The Presentation of Self in Everyday Life*. Anchor: New York, 1959.

- [113] E. Lupton, “Reading isotype,” *Design Issues*, vol. 3, no. 2, pp. 47–58, 1986. [Online]. Available: <http://www.jstor.org/stable/1511484>
- [114] J. Boy, A. V. Pandey, J. Emerson, M. Satterthwaite, O. Nov, and E. Bertini, “Showing people behind data: Does anthropomorphizing visualizations elicit more empathy for human rights data?” in *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. ACM, 2017, pp. 5462–5474.
- [115] D. A. Small, G. Loewenstein, and P. Slovic, “Sympathy and callousness: The impact of deliberative thought on donations to identifiable and statistical victims,” *Organizational Behavior and Human Decision Processes*, vol. 102, no. 2, pp. 143–153, 2007.
- [116] K. Jenni and G. Loewenstein, “Explaining the identifiable victim effect,” *Journal of Risk and Uncertainty*, vol. 14, no. 3, pp. 235–257, 1997.
- [117] TweetTracker, <http://tweettracker.fulton.asu.edu/>, 2012.
- [118] Ushahidi, <http://ushahidi.com>, 2018.
- [119] D. Yang and R. E. Kraut, “Persuading teammates to give: Systematic versus heuristic cues for soliciting loans,” *Proceedings of the ACM on Human-Computer Interaction*, vol. 1, p. 114, 2017.