

# Influence of Narrative Strategies on Fundraising Outcome: An Exploratory Study of Online Medical Crowdfunding

Lu Zheng\* and Lihui Jiang

**Abstract:** Online medical crowdfunding (OMC) has attracted massive attention and participation in China. Despite its goal to lift the financial burden caused by expensive medical expenditure, little has been done to evaluate its impact on healthcare inequality. We examine the social consequences of OMC based on a large random sample extracted from one of the most widely-used OMC platforms in China. Our analysis shows that a disproportionally high percentage of fundraising campaigns are launched for patients with low socioeconomic status suffering from various illnesses, including many rare diseases. These findings suggest that OMC plays a positive role in providing an alternative channel for disadvantaged patients under the current health insurance system. We further examine whether and the extent to which the narrative style of solicitation text—fundraising campaign description—influences fundraising outcomes using natural language processing (NLP). The results show that expressions conveying optimism tend to result in a higher completion ratio, whereas descriptions engaging in moral mobilization or focusing on financial burden tend to have a negative impact on fundraising outcomes.

**Key words:** online medical crowdfunding (OMC); narrative; fundraising outcome; healthcare inequality

## 1 Introduction

### 1.1 Rising popularity of online medical crowdfunding

Online medical crowdfunding (OMC), the solicitation of pecuniary support from a dispersed audience for personal medical costs, has grown rapidly and globally in recent years. On GoFundMe, the largest social crowdfunding platform in the world, medical-related campaigns consistently constitute the most popular category<sup>[1]</sup>. The total amount raised for medical expenses on GoFundMe had increased almost a hundredfold from 1.6 million US dollar in 2011 to 150 million US dollar in 2014 and rocketed to more than 650 million US dollar in 2016<sup>[2, 3]</sup>. GoFundMe claims to raise more than 650 million US dollar worldwide

annually<sup>[4]</sup>. Waterdrop Platform [*Shuidi Chou*], one of the top medical crowdfunding platforms in China, raised 45.7 billion RMB (approximately 6.84 billion US dollar) from the mid of 2016 when it was founded to the end of the third quarter of 2021. By launching fundraising campaigns on OMC platforms and broadcasting through social media, individuals mired in catastrophic medical expenses can solicit support to ameliorate their financial burden. Stories of desperate families getting through financial difficulties with the help of OMC indicate its role as a promising financing channel to address inequality in healthcare affordability.

### 1.2 Inequality: Different success rates

Even as OMCs increasingly gain traction and achieve impressive results, criticisms have also begun to emerge. One concern is that the enormous amount of money raised in total can lead to neglect of differential success rates across campaigns. A study of a sample of medical-related campaigns on GoFundMe found that fundraising goals ranged from 310 US dollar to 100 000 US dollar, with an average of 12 505 US dollar,

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while the average of money raised was 3034 US dollar, about one-fourth of the average target. Moreover, although the campaigns in the sample raised over 600 000 US dollar in total, 90% of them failed to reach their goals<sup>[1]</sup>. Previous studies attempting to uncover the factors leading to unequal outcomes have found that demographic characteristics such as age, gender, and race are associated with campaign outcomes<sup>[5]</sup>. Consequently, there is criticism that OMC, initially heralded as a digital safety net<sup>[6]</sup>, actually exacerbates health and social inequalities.

Despite its popularity, there is a paucity of empirical research on OMC in China to date. Corporate promotions and preliminary observations suggest that massive OMC initiators in China are individuals with low socioeconomic status (SES), indicating OMC's positive role in providing an alternative channel for the disadvantaged. Does the development of OMC in China have different effects from that in other societies? To answer this question, we conduct an empirical study of a China-based OMC which has kindly provided us privileged access to its data. Based on these data analyses, we can answer questions such as who is seeking help, to what extent the OMC could reach its intended beneficiaries, and what the overall distribution of the amount of money solicited and actually raised across campaigns is. Using a sample of 50 000 fundraising campaigns, we examine the demographic characteristics of beneficiaries and the distribution of illness types on the OMC. The large proportion of beneficiaries with low SES and a variety of diseases suggests OMC does make a difference in ameliorating high out-of-pocket medical expenses for disadvantaged patients.

Moving beyond the existing literature that focuses on the association between beneficiaries' SES and fundraising outcomes, we further explore the influence of narrative style on fundraising outcomes. As a non-traditional financing approach, OMC platforms themselves do not provide face-to-face interaction opportunities between potential supporters and the initiator, making solicitation text, the medium of communication, much more important and consequential. Since crowdfunding typically addresses diverse crowds, most of whom are strangers, the links between an initiator's illness experience, financial burden, and deservingness are best understood within a narrative framework presented online. In turning our

attention to the language and narrative style of OMC, we use machine learning techniques and identify five narrative strategies used in solicitation text, namely moral mobilization, optimism, value characteristics, financial burden, and reciprocity promise<sup>[7, 8]</sup>. Our analysis indicates that different strategies have heterogeneous influences on campaign outcomes. Texts conveying optimism are rewarded while those emphasizing financial burden and moral mobilization are penalized. Our analysis offers new insight into the factors that influence crowdfunding success. By analyzing narrative as a means of impression management and request tactics in online communication, we also add to the literature on the contextual nature of charitable giving and the persuasion effect of narrative.

The rest of the paper is organized as follows. We first explain the emergence and popularity of OMC in China by examining healthcare disparities caused by hefty medical expenses and identifying the vulnerable social groups under the current healthcare system. Then, we conduct a series of data analyses to reveal the demographic characteristics of patients and the types of diseases they suffer from in order to shed light on the role of OMC in moderating inequality in healthcare affordability. Regression analysis is employed to examine whether narrative strategies influence the completion rate. Robustness checks are conducted to consolidate the above results. We conclude with a discussion of our results and directions for future research.

## 2 Literature

The remarkable prevalence of OMC in both liberal healthcare systems and national health insurance systems indicates that OMC has increasingly become a critical complement in healthcare systems worldwide. In the US, increasing healthcare costs<sup>[3]</sup>, fiscal crises in the American healthcare and social assistance systems<sup>[1]</sup>, and gaps in the social safety net<sup>[9]</sup> have made medical expenses the leading cause of individual bankruptcy<sup>[10]</sup>, and contributed to the rise of OMC. Counterintuitively, in Europe, where most residents are provided with universal or nearly universal health coverage, OMC has an extensive market as well. Universal health coverage is critical in lowering out-of-pocket medical expenses, yet its effect in ameliorating the financial burden of

healthcare can be limited. For instance, some novel therapies in cancer treatment, though scientifically proven, may not be covered by the statutory health insurance system<sup>[11]</sup>; some rare diseases without mature treatments may also not be covered by medical insurance. Furthermore, even though the ratio of out-of-pocket expenses can be reduced by insurance, it may still be a heavy burden for families with several members who are severely sick, let alone the lost wages because of illness and travel-related costs to access care<sup>[12]</sup>. Similarly, in China, although the coverage of the medical insurance system has become almost universal, domestic OMC has developed rapidly.

## 2.1 OMC in China

The popularity of OMC in China is largely due to the heavy and unequal financial burden of medical expenditure across population groups in a fragmented health insurance system<sup>[13]</sup>. Despite the fact that China has a basic medical insurance system with universal coverage, the depth of financial protection is relatively low, and the degree varies greatly across different schemes within the system. The continuous expansion of the coverage of basic medical insurance is one of the most notable achievements of China's healthcare reform<sup>[14]</sup>. On one hand, the proportion of the population covered has increased from 15% in 2000 to over 97% in 2015. The coverage and reimbursement ratio has increased year by year, with the share of out-of-pocket expenses consistently going down, from as high as 60% of total medical expenditures in 2000 to less than 30% in 2017<sup>[15]</sup>. On the other hand, there is systematic inequality of benefit packages of basic health insurance across social groups<sup>[16]</sup>.

China has implemented a comprehensive social basic medical insurance system since 2003, and now the system includes three major schemes: the rural new cooperative medical scheme (NCMS), urban resident based basic medical insurance scheme (URBMI), and urban employee based basic medical insurance scheme (UEBMI)<sup>§</sup>. These three schemes have different funding

sources and reimbursement rates, being operated separately nationally and locally<sup>[19]</sup>. NCMS is much disadvantaged in reimbursement rate and service coverage compared to URBMI or UEBMI. Moreover, the level of protection of NCMS depends on the fiscal capacity of the local government, meaning that NCMS offers better benefits packages in rich counties than in poor counties. Fragmentation in these schemes prevents tens of millions of migrant workers<sup>[20]</sup>, who are of rural origin and work in cities, from receiving service from the health care system<sup>[13, 21–23]</sup>. In addition, the proportion of Chinese residents who are willing to purchase commercial medical insurance as an extra layer of protection is very low, approximately under 10%<sup>[24]</sup><sup>‡</sup>. Altogether, these limitations make the burden of expensive medical expenditure caused by a sudden critical illness extremely difficult to bear for most Chinese households.

To expand reimbursement to critical illness, the central government in China issued a Guidance in 2012 that proposed to develop critical illness insurance for urban and rural residents<sup>[25]</sup>. This helps to reduce high out-of-pocket medical expenses beyond reimbursement of basic medical insurance<sup>[26]</sup>. According to the Guidance, the total reimbursement rate should not be less than 50%. The critical illness insurance program was piloted in more than 134 cities in 2013 and implemented nationally in 2016<sup>[27]</sup>. Critical illness insurance is mainly funded through social health insurance surpluses without additional premiums from the insured. Since the funding pool of social health insurance is coordinated mostly at the city (prefecture) level (some provinces have coordinated at the provincial level), there is great regional variation in the implementation of critical illness insurance in terms of deductible, cap, and standard reimbursement amount. The implementation of critical illness insurance for rural residents was based on illness type at first. Twenty kinds of severe illness were required by the central government in 2013 to be covered by critical illness insurance (with this number increasing to twenty-two one year later). After 2016, with the advancement of integration of URBMI and NCMS, it became a mainstream practice to implement critical illness

<sup>‡</sup>According to the National Bureau of Statistics of China, there were 29.77 million migrant workers in 2019.

<sup>§</sup>The proportion estimated in two nationwide surveys CGSS 2015 and CHFS 2015 are similar, slightly lower.

<sup>§</sup>China's basic medical system has changed greatly in the reform era since 1978 and especially during the medical reform era since 2009. The urban employee based basic medical insurance scheme has its origin in the public medical insurance (PMI) program and the Labor Medical Service program, both of which can be dated back to the planned economy era. The PMI is a free medical insurance scheme without premiums and is designed for civil servants and employees of public institutions. The 2009 medical reform scheme requires the integration of the PMI and UEBMI. However, the pace of integration varies greatly by region, and PMI still exists in some regions. More detailed descriptions can be found in Refs. [16–18].

insurance based on out-of-pocket expenses after social health insurance reimbursement rather than critical illness. Due to the regional difference in the implementation of critical illness insurance, the limited literature on this topic to date has not reached a consensus on its effect on financial protection<sup>[25, 28, 29]</sup>.

From the review above, it is evident that the rural population with NCMS and migrant workers are the most vulnerable groups in the current medical insurance system. Another disadvantaged group is patients with rare diseases. According to statistics released by the National Healthcare Security Administration, among 121 drugs for rare disease treatment, about two-thirds have been included in the National Catalog of Basic Medical Insurance so far<sup>†</sup>. Limited by the affordability of medical insurance funds, some expensive drugs for rare disease treatment have not yet been included in social medical insurance<sup>[32]</sup>. Moreover, the financial burden caused by illness results in huge family medical debt. Social health insurance and critical illness insurance could reduce the financial burden caused by medicine and treatment expenses, but they fail to relieve the financial pressures caused by unemployment due to illness, transportation fees, and other economic losses. For example, given the unbalanced distribution of medical resources across regions, patients in less developed regions have to pay more to access adequate medical resources.

By analyzing family medical debts, we can learn more about the financial burden due to illness. Using data from the China Household Finance Survey (2015), a national survey, we found that 4.94% of respondents claimed that their family had unpaid loans due to medical expenses. In comparison, those with educational debt made up only 3.08% of respondents. This indicates that more families borrowed money to pay for health care than for education. Families with medical debts are distributed in both urban (including cities and towns) and rural areas, with two-thirds of

<sup>†</sup>Over the past few years, China has paid greater attention to the topic of rare diseases and made considerable efforts to gradually improve the situation of patients with rare diseases in terms of diagnosis, treatments, access to medication, as well as affordability of care. To increase affordability, the National Healthcare Security Administration has covered an increasing number of drugs to treat rare diseases under basic medical insurance and has also negotiated to reduce the price of some drugs to further reduce the economic burden. According to the statistics, as of 2021, after the national medical insurance negotiation, 58 drugs have been included in the national medical insurance, accounting for 67% of the marketed rare disease drugs. More detailed information can be found in Refs. [30, 31].

them (66.2%) being rural families (currently living in a house located in rural areas). The average size of these loans per household is 36 830 RMB (approximately 5700 US dollar), and the average of the largest single loan is 25 989 RMB (approximately 4020 US dollar). Up to 94% of the largest loans come from relatives, including parents, parents-in-law, children, siblings, other relatives, and friends/colleagues (including neighbors). Among these, loans from siblings make up the largest share (37.73%). Considering China's one-child generation, medical debts may become more severe in the coming future. At the national level, impoverishment by medical expense (IME) is still severe in China. According to the data from the State Council's Poverty Alleviation Office, households who went bankrupt or returned to poverty due to illness accounted for 42.2% of all poverty-stricken households in 2014; the proportion in 2015 was 44.1%<sup>[33]</sup>.

## **2.2 Emergence and popularity of OMC and its inequality in outcomes**

Crowdfunding platforms serve as a form of technological infrastructure that provides fundraisers alternative choices to get financial support. Studies on OMC campaigns launched by Americans on GoFundMe found that patients were disproportionately located in states that had not accepted Medicaid expansion under the Affordable Care Act<sup>[1]</sup>, proving an important supplementary role that OMC plays when social safety nets fail. OMC is also fueled by the emergence of the sharing economy and the ubiquity of digital media<sup>[34]</sup>. There are various forms of OMC in terms of fundraisers and funding purposes. Renwick and Mossialos<sup>[35]</sup> made a typology for crowdfunded health projects and divided them into four categories: finance health expenses, health initiatives, health research, and innovative healthcare ventures. Our focus in this study is OMC campaigns that are launched for specific patients with illness and financial needs and spread through popular social media in China like Wechat, Weibo, and Baidu Tieba. Thanks to the ubiquity of social media, crowdfunding can quickly mobilize resources across geographic regions with little cost. This makes crowdfunding a mechanism for democratizing charity in that anyone can utilize or contribute to it.

However, empirical research that explores the



outcomes of fundraising campaigns indicates that convenient access to financing does not guarantee fundraising success. First of all, the usage of crowdfunding itself reflects some forms of social inequality. Spatial analysis of Canadian cancer campaigns found that the use of OMC was mostly located near city centers and correlated with income, home ownership, and education attainment<sup>[36]</sup>. Outcomes of campaigns also vary greatly across population groups. Age, gender, and race are demographic characteristics that influence OMC outcomes in the USA, Canada, and UK<sup>[37]</sup>. Like reward-based crowdfunding, the success of charity-based medical crowdfunding relies heavily on patients' socioeconomic status<sup>[38, 39]</sup>. The influence of socioeconomic status on crowdfunding success reflects on both cultural capital, namely Internet literacy, and social capital, which is frequently measured by the number of donors or the diversity of confirmers. As campaign solicitations diffuse through social media, researchers have also explored the effect of social networks per se, indicating that the number of followers on social media platforms has a positive influence because more followers mean greater exposure and thus the opportunity to mobilize larger potential donors<sup>[38–41]</sup>. Snyder<sup>[3]</sup> argued that OMC is actually encouraging the commodification of health care, leading to the unfair distribution of resources based on “personal appeal, sensationalism, one's social position, or luck” instead of need or efficiency. Race and gender disparities exist in media literacy, access to technology, and social networks, all of which are pillars that OMC heavily relies on. Thus, some scholars maintain that instead of ameliorating health inequality caused by medical expenses, OMC may actually reinforce it.

### **2.3 OMC as an alternative financing channel and the importance of narrative in OMC**

Before the emergence of OMC, individuals with medical financial difficulties normally turned to the existing offline social networks, such as clans [*zongzu*] (i.e., lineage or kinship group), religious groups, local communities, etc. Clans are “sib organizations” in that members are connected to each other by blood ties [*xueyuan*]. In traditional China, clan organizations own land so as to accumulate public property and provide help to individuals who are in need, such as the elderly,

the sick, or students from poor families. Clan membership is an individual's social capital<sup>[42]</sup>. Similarly, religious groups and local communities are associations where members trust and help each other. A large body of literature has explored the effects of online social networks, confirming their vital role in crowdfunding success<sup>[41, 43, 44]</sup>. An online social network is the source in which social capital is embedded<sup>[45]</sup>. These works define social capital in a considerably broad way, measuring it, for example, as the number of followers on social media. This conceptualization partly captures the viral dissemination feature of social media by assuming that the more followers one has, the higher one's exposure to potential donors.

To better understand the characteristics of crowdfunding, a comparison between crowdfunding and traditional financing methods is in order. The concept of crowdfunding originates from micro-finance<sup>[46]</sup> and crowdsourcing<sup>[47]</sup>. In a crowdfunding campaign, the initiator gets financial support from a large group of donors, each of whom only needs to donate a small amount. As for OMC, it differs from traditional channels mentioned above along three main dimensions, namely the interaction medium, types of backers, and motivation of donation (see Table 1). These differences indicate that OMC has a unique mechanism for fundraising. The interaction medium for OMC is an Internet-based platform where potential donors make decisions in the absence of face-to-face communication or other visual cues. In terms of types of donors, supporters in traditional financing methods tend to be fellow members of the same clan, guild, religion, or local community, whereas in OMC supporters are more diversified, including many total strangers. Thus, the motivations that drive people to donate are different as well. Supporters in traditional financing methods donate largely because of existing social relationships. In contrast, donors in OMC may have multiple reasons, such as altruism, warm glow feeling according to the self-determination literature<sup>[48–51]</sup>, as well as social norms or peer pressure according to social interaction literature<sup>[44, 51]</sup>. Regardless of motivations, a donation is structured, promoted, and legitimized by fundraisers to attract attention and to mobilize the remote audience's pecuniary support<sup>[52]</sup>. The key for fundraisers to draw

**Table 1 Comparison of OMC and traditional financing channels.**

| Financing channel              | Interaction medium     | Type of supporters                                            | Motivation of donation                              |
|--------------------------------|------------------------|---------------------------------------------------------------|-----------------------------------------------------|
| OMC                            | Internet, social media | Multiple, rely heavily on strangers                           | Multiple: charity, empathy, self-satisfaction, etc. |
| Traditional financing channels | Face to face           | Prior social relationships including relatives, friends, etc. | Reciprocity, soft obligation                        |

attention in fierce competition with numerous other campaigns is solicitation text. The ability to appeal to a large number of diverse and dispersed audiences and evoke sympathy without face-to-face interaction is the so-called “media literacy”, a culturally cultivated skill of story-telling<sup>[1, 7]</sup>.

#### 2.4 Persuasion effect of narrative

The persuasion effect of narrative has been explored in various contexts. Narratives influence people’s behavior in economic decisions, marketing, health invention, public belief, etc.<sup>[53, 54]</sup> Consumer psychologists have shown that narratives in advertisements exert great influence on consumers’ purchasing behavior<sup>[55]</sup>, and the persuasive effect is more prominent when consumers are unfamiliar with the topic<sup>[56]</sup>. Narratives are also found to be more effective in advising healthy behaviors compared to traditional health messages like outlining risks, symptoms, etc.<sup>[57]</sup>

In the literature on crowdfunding, empirical research has suggested multiple roles of narrative in conveying novel information, persuasion, self-image construction, etc.<sup>[58]</sup> Successful entrepreneurs often build legitimacy for their start-ups with a compelling narrative that bridges both novelty and familiarity<sup>[59]</sup>. Various conceptualizations of narrative have been studied. In contrast to studies that focus on the form of textual message like the length of text, narrative analysis pays more attention to the content of the text. One way to investigate narrative is to look into its temporal structure, the way it frames and connects historical development, and the potential futures of projects<sup>[60, 61]</sup>. Another way is to explore the influence of the linguistic pattern of narrative. One study shows that the predictive power of language in reward-based crowdfunding can be as high as 58.56%<sup>[62]</sup>. Organizing language in the text is regarded as a tactic of identity construction and impression management. The use of reciprocity phrases and words conveying positive emotions or gratitude is found to positively predict campaign success<sup>[63, 64]</sup>.

Money-related descriptions or justification for an individual’s current financial situation are negatively related to a successful outcome. Reference <sup>[65]</sup> further indicated that linguistic patterns are related to gender, and that by rewarding female-related linguistic patterns as the use of positive, vivid, and inclusive language, online crowdfunding reduces gender inequality in economic financing. In contrast to ample studies on reward-based crowdfunding<sup>[61, 66–68]</sup>, studies of charity-based crowdfunding including OMC are relatively scarce<sup>[7, 8, 69]</sup>. By quantitatively analyzing various narrative strategies, this study tries to advance knowledge on the persuasion effect of narrative in promoting online charity donations. In accordance with the guidelines of OMC platforms, solicitation text typically contains three parts: (1) a description of the illness, (2) a request for help, and (3) an expression of gratitude. These three parts are loosely connected in terms of temporal structure, so we explore the influence of narrative by looking into its linguistic patterns.

### 3 Hypothesis

In recognizing the importance of solicitation text, thematic narrative analyses of OMC solicitation texts have been conducted in the literature. Xu and Wang<sup>[7]</sup> analyzed 100 solicitation texts on Easy Fundraising, one of China’s most well-known OMC platforms. Berliner and Kenworthy<sup>[1]</sup> and Paulus and Roberts<sup>[8]</sup> analyzed 105 and 200 medical-related campaigns from GoFundMe, respectively. Researchers have found that mentions of financial hardships and the effects of insufficient and expensive health insurance were common in text accounting for the fundraising motivation<sup>[1]</sup>. An analysis of GoFundMe’s advice to campaigners indicates that the platform tries to make fundraisers believe that campaign reach is largely determined by their narratives presenting deservingness. For example, the platform advises that “a personal ‘rally’ against a specific illness is more compelling than an

exclamation of financial need". Paulus and Roberts<sup>[8]</sup> found while fundraisers generally adopted strategies advised by the platform, some came up with two strategies that help them maintain dignity as asking for money was considered a cultural taboo. One tactic is to establish the worth or merit of the cause in culturally relevant ways; the other involves burying the request for money at the end of the narratives. Specifically, campaigns usually describe the person in need as part of a community or nuclear family to situate him/her in a positive state of being loved and valued or frame him/her and the crisis itself as worthy causes by characterizing patient as determined and devoted and the crisis as an unexpected misfortune. To alleviate the shame of seeking financial help, fundraisers tend to make requests at the end of the text with a "soft expression". Xu and Wang<sup>[7]</sup> identified three strategies that were frequently used in narratives: identity construction, emotion mobilization, and self-esteem maintenance. They found that fundraisers usually balanced self-image by emphasizing both illness tragedy and positive personality and tended to promise to contribute back to society in the future.

While the above researchers illustrated the initiators' effort to construct identity and manage impressions, to better understand the crowdfunding process we also need to know how potential donors perceive texts and how narratives influence their decisions. Kim et al.<sup>[70]</sup> interviewed both OMC beneficiaries and donors to discover both how fundraisers conveyed information to solicit financial support and how potential donors perceived these expressions. They found that there was a misalignment between fundraisers' estimations and contributors' expectations. Fundraisers felt obliged to present the desperation and urgency of their situations as great enough to deserve financial support, while contributors were often touched by the contrast between bright, positive personalities before the illness and suffering after the illness. By empirically examining the influence of narrative strategies on campaign outcomes, our study tries to bridge the thematic narrative analysis and the literature on crowdfunding success.

Narratives serve as vehicles for identity construction and impression management. Individuals strategically use narratives to "establish, maintain, or protect" their desired identities, which are selected from a repertoire

of self-images that they "genuinely believe to be true", so as to obtain specific outcomes<sup>[67, 71, 72]</sup>. As OMC is a "market" competing for attention, individuals select self-images that they believe will garner support. It is vital for narratives to conform to some specific cultural identity or belief system to impress and resonate with the audience<sup>[73, 74]</sup>. Based on the literature and keyword analysis, we identified five strategies frequently used in solicitation text in the OMC platform we analyzed: (1) characteristics and value; (2) optimism expression; (3) moral mobilization; (4) emphasis on financial burden; and (5) reciprocity promise. Among these strategies, the expression of an individual's personality or his/her value to family and the expression of optimism are narratives employed by initiators to manage impression. The personalities of perseverance and virtues like filial piety are appreciated in Chinese culture<sup>[7]</sup>. The perseverant and optimistic personalities before the illness are placed in sharp contrast with the sufferings caused by the illness, making it easier for the audience to get into the tragic atmosphere and be touched to donate<sup>[7]</sup>. Expressions of optimism demonstrate the belief that the patient or his/her family will never give in to illness. Those self-image presentations create a "worthy" atmosphere. Thus, we hypothesize:

**H1: Expression of an individual's personality or his/her value to the family as a narrative strategy has a positive influence on OMC outcomes.**

**H2: Expression of optimism as a narrative strategy has a positive influence on OMC outcomes.**

Charitable donation, in the context of relational interaction, is a contingent behavior that can be shaped and promoted<sup>[65]</sup>. Requests are vital for individuals to make decisions about whether or not to donate. Studies of charitable donation have underscored that while a direct request is a determining factor for participation<sup>[75, 76]</sup>, narratives of solicitation text serve as tactics that influence donation behavior. Moral mobilization places the audience in a high moral position and thus ignites their moral values to show empathy. Expression of the financial burden is another way to solicit, but Gorbatai and Nelson<sup>[65]</sup> have found that this may appear "formulaic and dry" to audiences. Expression of reciprocity is rewarded in business crowdfunding<sup>[62]</sup>. Though donors in charitable crowdfunding expect no reward, it is possible that a promise of reciprocity may legitimize the request for

pecuniary support, leading to a higher likelihood of fundraising success. Thus, we hypothesize:

**H3: Moral mobilization as a narrative strategy has a positive influence on OMC outcomes.**

**H4: Expression of financial burden has a negative influence on OMC outcomes.**

**H5: Reciprocity as a narrative strategy has a positive influence on OMC outcomes.**

## 4 Data and Method

The data used in this research come from one of the leading medical crowdfunding platforms in China, Waterdrop Platform [Shuidi Chou]. Waterdrop Platform, a division of Waterdrop Inc., was founded in June 2016. It is positioned as a free Internet platform aiming to help those diagnosed with serious diseases raise money. The complete process of a crowdfunding campaign includes initiation, spreading the words, and withdrawal of the fund raised. In a typical case, the patient or her/his family member initiates a fundraising campaign by composing and uploading a text describing her/his illness and dire financial circumstances with some proof materials, which may include diagnosis from doctors, medical bills, and evaluation of the family property. Once the platform has verified all submitted materials, the fundraising campaign is presented on a separate web page. Fundraisers then spread the information by sharing the URL link of the web page with friends through social media, in most cases via WeChat. When the target amount is reached or the campaign has lasted for 30 days (whichever happens first), the platform ends the campaign and the fundraiser can apply for withdrawal of the money raised. If there is no objection within the subsequent 24-hour publicity period, the raised fund is transferred to the beneficiary's personal bank account within 1–2 working days.

The sample analyzed in our study is 50 000 or so fundraising campaigns randomly drawn from the Waterdrop Platform, all of which were initiated during the period of mid-2016 to August 2019. Though Waterdrop Platform is just one of the two largest online medical crowdfunding platforms in China, there is no evidence that fundraising projects on this platform are systematically different from those on the Easyto, the commercial rival of Waterdrop. Moreover, we consider that solicitation texts created in the study period better

reflected the real preferences of initiators. Since August 2019, OMC platforms including Waterdrop have dispatched consultants to help potential initiators launch campaigns, including by providing templates of solicitation texts. We do not know whether these templates are based on past fundraising data. Hence, it is difficult to say whether the impact of solicitation templates is random. It is possible that platforms choose more “effective” templates based on data and persuade initiators to write in a specific way. Though people may search online for solicitation templates even without these platform-provided templates, we believe the choice itself reflects the preference for narrative strategies.

Data of each campaign include target amount, number of “shares”, number of donors, amount received, length of solicitation text, etc. We were able to infer some demographic characteristics of patients such as age, gender, occupation, etc., from the solicitation text.

### 4.1 Variable

The dependent variable in this study is the relative success of the campaign or the completion ratio, which is measured by the ratio of the amount raised to the target amount. We drop 12 cases from the sample for their small target amounts (less than 1000 RMB). These cases often achieved disproportionately high ratios, among which the extreme case obtained 25 times the target amount.

The main independent variables are narrative strategies. As mentioned above, there are five major types of narrative strategies, including characteristics and value to the family, moral mobilization, optimism, financial burden, and reciprocity. We measure strategies by identifying keywords from solicitation text. Since there is no dedicated dictionary of crowdfunding narratives, we decide to manually build one. First, we combine solicitation texts in the sample into one document as a corpus and use the Python package “jieba”, an open-source algorithm of text segmentation for Chinese text, to segment it. Using the general Chinese stop words list, we are able to drop out many meaningless words. Then the frequency of each word kept is calculated. Finally, we export all words kept in descending order. We then try to manually build a crowdfunding-specific dictionary in two ways. Firstly, we check these words to further sort out context-meaningless words which are not included in the



general Chinese stop words list but are irrelevant to crowdfunding narrative. For example, words like “here” (*zheli* 这里), “there” (*nali* 那里), and “everyone” (*gewei* 各位) have high frequencies in the corpus but have little effect in helping us understand the crowdfunding narrative, so their “presence” in high-frequency word list may mask real important words that help us get meaningful knowledge from the research objects. Secondly, the *jieba* algorithm may divide some meaningful phrases into separate words and thus obscure their meanings. For example, “never” and “give up” are usually treated in the algorithm as separate words which means they will be divided during text segmentation. However, according to our observations, “never give up” is frequently expressed in solicitation texts as a phrase to express one’s determination to fight against the disease. We hence add “never give up” to the stop words list to make sure they will not be divided and dropped during the data cleaning process. In summary, we supplement the general Chinese stop word list with those context-irrelevant words and context-meaningful phrases (which should not be divided) to build our specific dictionary. We repeat this process several times to increase the accuracy. Each time the frequency of each segmented word is calculated and we export these words in descending order. After repeating this process

several times, we end up with the 2000 meaningful words with the highest frequencies. Then, we identify words or phrases that are the most relevant to the strategies discussed above. The final step is to assign the value of 1 to campaigns whose text contains phrases presenting a specific strategy and assign the value of 0 to the others. The categories are not mutually exclusive. One campaign text may adopt more than one type of strategy. Detailed information on narrative strategies and sample wordings are presented in Table 2.

Control variables include target amount, illness type, patient’s age, gender, number of donors, number of shares, number of confirmers, text characteristics including sentiment score of text as well as the title, the number of text words (the length of the text), and the number of pictures. We also control variables including whether the patient has any commercial medical insurance and the ranking of per capita GDP of the province where the patient is located (2016, descending order). The number of text words, number of donors, number of shares, and target amount are each divided by 1000 times to make the regression coefficients meaningful. As types of illness are numerous, we classified them into cancer and non-cancer in the main model, assigning 1 to cancer and 0 vice versa. The funding pool of basic medical insurance in China is

**Table 2** Narrative strategies and sample wordings (N=49 999).

| Strategy                            | Phrase presenting strategies                               | Adoption rate (%) |
|-------------------------------------|------------------------------------------------------------|-------------------|
| Characteristics and value to family | “Have a great love for life”(热爱生活)                         | 49.22             |
|                                     | “Strong-willed”(坚强)                                        |                   |
|                                     | “Optimistic”(乐观)                                           |                   |
|                                     | “Breadwinner”(顶梁柱)                                         |                   |
|                                     | “Being happy”(幸福美满/幸福快乐/其乐融融)                              |                   |
|                                     | “Filial piety is the most important of all virtues”(百善孝为先) |                   |
| Optimism                            | “Never give up”(绝不放弃)                                      | 21.16             |
|                                     | “A glimmer of hope for survival”(一线生机)                     |                   |
|                                     | “Try to survive”(活下去)                                      |                   |
|                                     | “Try as hard as we can”(竭尽所能)                              |                   |
| Moral mobilization                  | “The good-hearted”(爱心人士/好心人)                               | 50.76             |
|                                     | “Good wish to good man”(一生平安)                              |                   |
|                                     | “Many thanks for saving my life”(救命之恩)                     |                   |
|                                     | “Own you a deep debt of gratitude”(没齿难忘/没齿不忘)              |                   |
| Financial burden                    | “Savings”(积蓄)                                              | 62.37             |
|                                     | “Huge amount”(天文数字/巨额)                                     |                   |
|                                     | “Heavily in debt”(负债累累)                                    |                   |
|                                     | “Being desperate”(走投无路/难以承受/无奈/万般无奈)                       |                   |
|                                     | “Making things worse”(雪上加霜)                                |                   |
|                                     | “Far from enough”(杯水车薪)                                    |                   |
| Reciprocity                         | “Will help others in return”(回报/回馈/报答)                     | 7.99              |

mostly coordinated at the prefecture level (municipalities and some provinces like Hainan, Fujian, and Tibet have achieved provincial-level coordination), leading to different reimbursement policies. Regions with a higher level of economic development usually have higher reimbursement ratios, and thus fewer out-of-pocket expenses. Therefore, we control for the ranking of per capita GDP of the patient's home province (2016) to rule out its possible confounding effect.

A descriptive analysis of the variables except for the independent variable is presented in Table 3. The right-skewed distribution of the main variables, including target amount, received amount, the number of donors, the number of shares, etc., indicates the existence of a maximum that pulls up the average. It corresponds with the anecdote that there are extremely successful campaigns in OMC.

#### 4.2 Method

We apply both descriptive analyses and regression models to the data. First, we conduct some descriptive analyses to find out whether OMC provides an alternative financing approach for those who are the most vulnerable in the health care system and whether and the extent to which inequality among OMC campaigns exists in China, as that in other countries. The descriptive analysis is used to examine the

quantitative distribution of the social background of those who seek help. We pay particular attention to those who are peasants, migrant workers, or from rural areas. We are also curious about the frequencies of different types of diseases because of which people fall into financial trouble. For example, cancer patients or those diagnosed with rare diseases are more likely to be subject to hefty medical bills. In all, we are curious about who is seeking help through the online platform and whether they overlap with those who are systematically disadvantaged in the basic health insurance system.

To account for the relative success of fundraising campaigns, we adopt Tobit regression model. The Tobit model was first proposed by Tobin in 1958 to model nonnegative continuous variables with several observations taking value 0<sup>[77]</sup>. This model has been widely used to handle truncated data, especially left-censored data. Thus, Tobit model is suitable for the dependent variable in our analysis. Our dependent variable, the funding ratio, is a continuous variable with a minimum of 0. Theoretically, there is no ceiling to the ratio. As we have mentioned above, for those campaigns with a target amount less than 1000 RMB, the completion ratio easily exceeds 1 (which means the amount they raised is actually more than the “target amount” they claim in the campaign), and the most

**Table 3** Descriptive statistics of campaign characteristics (N=41 293).

| Variable                             | Mean      | Standard deviation | Median   | Min  | Max       |
|--------------------------------------|-----------|--------------------|----------|------|-----------|
| Completion ratio (relative success)  | 0.17      | 0.17               | 0.11     | 0    | 1.12      |
| Target amount                        | 189 043   | 136 798.20         | 150 000  | 3000 | 1 000 000 |
| Received amount                      | 26 403.34 | 36 782.04          | 16 445.5 | 1    | 990 571   |
| Number of donors                     | 833.58    | 1.28               | 495      | 0    | 50 931    |
| Number of shares                     | 605.65    | 1.12               | 378      | 0    | 72 321    |
| Number of confirmers                 | 34.95     | 32.78              | 26       | 0    | 1160      |
| Number of pictures                   | 5.65      | 4.70               | 5        | 0    | 119       |
| Average donation per donor           | 35.45     | 22.03              | 31.95    | 1    | 1878      |
| Length of solicitation text          | 427.94    | 247.93             | 392      | 20   | 2977      |
| Sentiment score of text              | 45.43     | 51.50              | 37       | −301 | 558       |
| Sentiment score of the title         | 2.34      | 11.04              | 0        | −66  | 95        |
| Patient age                          | 44.61     | 17.33              | 48       | 0    | 97        |
| Male (1=male)                        | 0.60      | 0.49               | 1        | 0    | 1         |
| Medical insurance (1=yes)            | 0.62      | 0.48               | 1        | 0    | 1         |
| Commercial medical insurance (1=yes) | 0.03      | 0.18               | 0        | 0    | 1         |
| Cancer (1=yes)                       | 0.43      | 0.50               | 0        | 0    | 1         |
| Ranking of provincial per capita GDP | 17.35     | 0.75               | 17       | 1    | 31        |

successful campaign raised 25 times of the target amount. Even without considering these campaigns, we can still observe campaigns in which the completion ratio exceeds 1. As shown above, the maximum of completion ratio of campaigns with a target amount greater than 1000 RMB is 1.12. In reality, however, the fundraisers often close the campaign when they have raised an amount equal to or approaching the target. Campaigns that can reach the target amount are actually the minority. Therefore, the dependent variable, the completion ratio, is censored both on the left and the right. We thus adopt Tobit regression model to examine the relationship between a censored continuous dependent variable and independent variables.

## 5 Main Findings

### 5.1 Descriptive analysis: Who is seeking help?

We first conduct a descriptive analysis to examine the effect of OMC in alleviating healthcare inequality. We examine whether OMC alleviates healthcare inequality in two aspects. First, as mentioned above, people of rural origin, mostly peasants and migrant workers, are the most vulnerable in both the basic and commercial medical insurance systems. OMC may serve as one of the last resorts for those who may easily become impoverished by costly illness. Hence we can say that OMC relieves inequality in access to financial resources by providing an alternative financing channel for the disadvantaged population if they are prevalent on OMC platform. Second, the type of illness appearing in OMC can be an indicator. Patients with cancer tend to shoulder the heavier financial burden of expensive treatments and additional costs including lost wages, nutritional costs, transportation costs, etc. However, expenses for medicine and treatment of rare diseases are usually not included or are too high to be covered by basic medical insurance. Moreover, because the risks of many rare diseases are concentrated, it is difficult for commercial insurance to diversify risk based on the law of large numbers, leading to a lack of corresponding commercial insurance products to cover rare diseases. OMC provides those with cancer or rare diseases with hope. Finally, our analysis of the data indicates that numbers of donors and shares easily exceeds one thousand in many campaigns, supporting the argument that OMC is better at mobilizing remote

audiences compared to traditional fundraising channels.

Information on occupation and disease is extracted from solicitation text using Python. The process used to obtain occupation information is similar to that of the narrative strategies discussed above. The description of the occupation is not formal enough, so we manually construct an occupation dictionary. For example, different descriptions of “jobless” can be observed such as “no job”[*wuye* 无业], “unemployed”[*shiye* 失业] and “between jobs”[*daiye* 待业]. So we use all these possible expressions as the measurement of “the jobless”. All occupations mentioned can be categorized into four types: the jobless, peasants, workers (including migrant workers like food delivery persons), and professionals (like teachers or grassroots civil servants).

The information on the disease is also extracted from the text. We distinguish diseases as cancer or non-cancer in our main analysis and include a more detailed illness type into regression models in the robustness check section below.

In terms of occupational status, 29 055 cases in the sample (58.11%) mention occupation in the solicitation text, among which 2.36% are those without a job, 60.5% are peasants, and 34.5% are workers, including temporary workers, construction workers, deliverymen, couriers, etc. There are also professionals seeking help, including teachers and grass-roots civil servants, although the proportion is relatively small (2.58%). Among all patients, the percentage of those without social medical insurance is as high as 37.74%, and the percentage of patients with commercial medical insurance is only 3.19%. The disproportionately high percentage of the jobless, peasants and workers, and patients without social medical insurance or commercial insurance indicates that OMC indeed provides a valuable approach for individuals to garner monetary support. In cases for the jobless, peasants, and workers, the average number of donors reaches 903, with a maximum of a stunning 40 185. It is reasonable to infer that a considerable number of donors are strangers to the patients in need. The average amount obtained of those cases is 27 239.5 RMB (approximately 4127.20 US dollar), slightly higher than the average of sampled cases, indicating that OMC has made a huge difference in the lives of tens of thousands of the disadvantaged.

Among illness types, patients with cancer constitute the largest category, exceeding 40% of the whole sample. This is true for both males (38.9%) and females (50.3%). For male patients, the second highest is circulatory system illness (5329, 18.4%), and the third is external trauma (3603, 12.4%). For female patients, 14.8% (2881) have circulatory system illness and 7.3% (1420) have genitourinary system illness. We also find some discrepancies between the leading causes of death in China<sup>[78]</sup> and the frequency of diseases in OMC (see Table 4). Road injuries, neonatal disorders, and depressive disorders are the top leading causes in real life but appear less frequently in OMC. In contrast, cervical cancer (2.3%) and ovarian cancer (2.5%), which ranked outside of the top 25 in leading causes of death in China, appear much more frequently in OMC. This discrepancy implies an important position of OMC in helping patients burdened by crippling medical expenses for severer diseases<sup>[39]</sup>.

It is also worth noting that a great variety of rare diseases appear in OMC, like Amyotrophic Lateral Sclerosis, Congenital Myotonia Syndrome, Langerhans Cell Histiocytosis, etc. Roughly estimated, more than 300 cases in the sample are rare diseases, accounting for 0.6%. The large variety of diseases that appeared in campaigns indicates that beneficiaries of OMC are widespread.

## 5.2 Inequality in OMC donation and the influence of narrative

Despite the active role of OMC in providing an

**Table 4 Comparison between top causes of death and top illness types in OMC.**

| Leading cause (2017)    | OMC                                                                     |
|-------------------------|-------------------------------------------------------------------------|
| Stroke                  | Chronic kidney disease (ranked 21 in leading causes)                    |
| Ischaemic heart disease | Leukemia                                                                |
| COPD                    | Stroke                                                                  |
| Lung cancer             | Lung cancer                                                             |
| Road injuries           | Cirrhosis (ranked 23 in leading causes), ovarian cancer, stomach cancer |
| Neonatal disorders      | Liver cancer, cervical cancer                                           |
| Liver cancer            | Congenital birth defects (ranked 20 in leading causes)                  |
| Diabetes mellitus       | Esophageal cancer (ranked 24 in leading causes)                         |
| Neck pain               | Diabetes mellitus, Nasopharyngeal carcinoma                             |
| Depressive disorders    | Colon cancer                                                            |

important alternative financing channel, there is inequality among campaigns. The Gini coefficient of the funding target is 0.37, while that of the received funding is 0.54, reflecting a greater level of inequality in OMC outcomes. The average completion ratio is 17%, much less than that on GoFundMe. Table 5 shows that the completion ratio decreases sharply as the target amount increases. Within the range of 10 000 RMB (1541 US dollar), fundraisers can receive almost half of the target amount. Campaigns with a target amount beyond 25 000 RMB, a number near the average amount received, have a completion rate of less than 25% on average.

To get a better understanding of the crowdfunding outcome, we further adopt Tobit model. Table 6 shows the results from the regression analyses. Because the variable of occupation contains a nontrivial proportion of missing value, we decide not to include it in the regression analyses. Model 1 examines the impacts of control variables. Models 2–6 separately evaluate the proposed hypotheses. Results from model 1 show the relationship between campaign text characteristics, patient demographic characteristics, and the relative success of campaigns. The number of words (length of text) and sentiment score of text as well as titles have no significant impact on completion ratio. It is interesting to find that, contrary to the belief that “a picture is worth a thousand words”, the number of pictures actually has a negative influence on completion ratio. This may be due to the high homogeneity of both the number and content of the images (mostly pictures showing patients lying in bed and diagnostic reports). We also test whether the number of pictures has a non-linear effect by including the square of picture numbers in the model, but this result is not significant. We also calculate the sentiment score of texts and titles by adding up the sentiment

**Table 5 Different completion ratios across target amounts.**

| Goal (RMB)         | Frequency | Completion ratio (%) |
|--------------------|-----------|----------------------|
| (1000, 10 000]     | 329       | 49.30                |
| (10 000, 25 000]   | 678       | 36.97                |
| (25 000, 50 000]   | 3901      | 24.28                |
| (50 000, 100 000]  | 11 485    | 18.19                |
| (100 000, 150 000] | 5008      | 15.70                |
| (150 000, 200 000] | 8962      | 13.44                |
| >200 000           | 10 930    | 12.70                |

**Table 6** Effects of narrative strategies on completion ratio.

| Variable                                                                 | Completion ratio (amount obtained/target amount) |                      |                         |                      |                      |                      |
|--------------------------------------------------------------------------|--------------------------------------------------|----------------------|-------------------------|----------------------|----------------------|----------------------|
|                                                                          | Model 1                                          | Model 2              | Model 3                 | Model 4              | Model 5              | Model 6              |
| Narrative                                                                | Moral mobilization                               | —<br>(0.001)         | —<br>0.004**<br>(0.002) | —                    | —                    | —                    |
|                                                                          | Optimism                                         | —                    | —                       | —                    | —                    | —                    |
|                                                                          | Value and characteristics                        | —                    | —                       | —0.001<br>(0.001)    | —                    | —                    |
|                                                                          | Financial burden                                 | —                    | —                       | —                    | —0.004***<br>(0.001) | —                    |
|                                                                          | Reciprocity                                      | —                    | —                       | —                    | —                    | —0.002<br>(0.002)    |
|                                                                          |                                                  | 0.000<br>(0.000)     | 0.000**<br>(0.000)      | 0.000<br>(0.000)     | 0.000**<br>(0.000)   | 0.000<br>(0.000)     |
| Number of text words                                                     |                                                  | —0.001***<br>(0.000) | —0.001***<br>(0.000)    | —0.001***<br>(0.000) | —0.001***<br>(0.000) | —0.001***<br>(0.000) |
|                                                                          | Number of pictures                               | 0.000<br>(0.000)     | 0.000<br>(0.000)        | 0.000<br>(0.000)     | 0.000<br>(0.000)     | 0.000<br>(0.000)     |
| Sentiment score of the title                                             |                                                  | 0.000<br>(0.000)     | 0.000<br>(0.000)        | 0.000<br>(0.000)     | 0.000<br>(0.000)     | 0.000<br>(0.000)     |
|                                                                          | Sentiment score of text                          | 0.000<br>(0.000)     | 0.000***<br>(0.000)     | 0.000<br>(0.000)     | 0.000<br>(0.000)     | 0.000<br>(0.000)     |
| Number of donors                                                         |                                                  | 0.074***<br>(0.001)  | 0.074***<br>(0.001)     | 0.074***<br>(0.001)  | 0.074***<br>(0.001)  | 0.074***<br>(0.001)  |
|                                                                          | Average amount of donation                       | 0.001***<br>(0.000)  | 0.001***<br>(0.000)     | 0.001***<br>(0.000)  | 0.001***<br>(0.000)  | 0.001***<br>(0.000)  |
| Number of shares                                                         |                                                  | —0.010***<br>(0.001) | —0.010***<br>(0.001)    | —0.010***<br>(0.001) | —0.010***<br>(0.001) | —0.010***<br>(0.001) |
|                                                                          | Number of confirmers                             | 0.001***<br>(0.000)  | 0.001***<br>(0.000)     | 0.001***<br>(0.000)  | 0.001***<br>(0.000)  | 0.001***<br>(0.000)  |
| Target amount                                                            |                                                  | —0.006***<br>(0.000) | —0.006***<br>(0.000)    | —0.006***<br>(0.000) | —0.006***<br>(0.000) | —0.006***<br>(0.000) |
|                                                                          | Medical insurance                                | 0.002*<br>(0.000)    | 0.002<br>(0.001)        | 0.002*<br>(0.001)    | 0.002*<br>(0.001)    | 0.002*<br>(0.001)    |
| Commercial medical insurance                                             |                                                  | —0.000<br>(0.003)    | —0.001<br>(0.003)       | —0.001<br>(0.003)    | —0.002<br>(0.003)    | —0.002<br>(0.003)    |
|                                                                          | Patient gender                                   | —0.001<br>(0.001)    | —0.001<br>(0.001)       | —0.001<br>(0.001)    | —0.001<br>(0.001)    | —0.001<br>(0.001)    |
| Patient age                                                              |                                                  | —0.001***<br>(0.000) | —0.001***<br>(0.000)    | —0.001***<br>(0.000) | —0.001***<br>(0.000) | —0.001***<br>(0.000) |
|                                                                          | Cancer                                           | 0.004***<br>(0.001)  | 0.004***<br>(0.001)     | 0.004**<br>(0.001)   | 0.004***<br>(0.001)  | 0.004***<br>(0.001)  |
| Rank of per capita GDP of patient's domicile province (descending order) |                                                  | —0.001***<br>(0.000) | —0.001***<br>(0.000)    | —0.001***<br>(0.000) | —0.001***<br>(0.000) | —0.001***<br>(0.000) |
|                                                                          | Constant                                         | 0.186***<br>(0.003)  | 0.186***<br>(0.003)     | 0.186***<br>(0.003)  | 0.187***<br>(0.003)  | 0.186***<br>(0.003)  |
| Observation                                                              |                                                  | 41 293               | 41 293                  | 41 293               | 41 293               | 41 293               |

Note: Standard errors in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ 

score of each word and include these variables in the model. The results show that neither the sentiment score of the text nor that of the title has a significant effect on the outcome. The number of donors, the number of confirmers, and the average amount of donations all have positive impacts on the completion ratio. The negative impact of the number of shares we found seems counterintuitive because usually more shares mean higher exposure to a larger group of potential donors. However, as Lacetera et al.<sup>[79]</sup> and

Kristofferson et al.<sup>[80]</sup> have argued, social media may stimulate costless and thus less impactful forms of involvement like “share” or “like” rather than pecuniary support, complicating the relationship between “share” and crowdfunding success. We speculate that this finding could be caused by two reasons. First, the assumption that a greater number of shares increase completion ratio is basically understood through network scale, which means that the larger the size of the network, the greater the potential for the



campaign to be exposed to a large audience. However, the data, though recording the number of shares, do not show whether campaigns are shared within different groups. For example, the fundraiser may share the campaign many times to a same group, which do not actually increase the network scale. Second, in accordance with existing literature, “share” and “donate” could be alternative choices for the audience, including potential donors. That means there is possibility that the high number of shares is actually at the expense of fewer donors. Although we control for the number of donors in the model, the exact mechanism of the negative influence of the number of shares on completion ratio is beyond the scope of this paper and needs to be further examined. The positive impact of the number of confirmers echoes previous findings that authenticity matters in crowdfunding<sup>[69, 81]</sup>. Having medical insurance is positively, yet weakly, related to the completion ratio. Campaigns with large target amounts are less likely to achieve their goals. The negative effect of the patient’s age indicates that the public are more likely to donate to younger patients. Those with cancer and those living in more developed provinces have a higher probability of success.

Models 2–6 separately test the influence of different narrative strategies on fundraising outcomes. Three narrative strategies show significant impacts. Phrases indicating moral mobilization and financial burden hinder the fundraising outcome while words exhibiting optimism significantly promote the completion ratio. Mentioning value or patient’s characteristic and expression of reciprocity has no significant impact on the outcome variable. The results suggest that there may be gaps between initiators’ intentions and potential donors’ feedback. Initiators may mitigate guilt from requesting financial support by framing the patient as the one valuable to family/community or by promising to contribute back to society, while the audience donate only when they see hope. Prior research has shown that people are more willing to give when they believe that their donation can “make a difference”<sup>[82, 83]</sup>. Expression of optimism signals the strong willingness of the patient and her/his family for treatment, making donors believe that their donation is meaningful. Moral mobilization, the strategy of placing the audience on a moral high ground, may backfire by making them feel obliged. Unlike traditional

philanthropy, the crowdfunding nature of OMC means the fundraiser obtains monetary support from a scattered audience where everyone donates a small amount of money. Putting one on a moral high ground may make her feel “morally hijacked” and thus triggers avoidance instead. For example, donors may feel awkward being praised with phrases like “you save my life” before making their 20 RMB (2.7 US dollar) donation. Such feelings may reduce their willingness to donate. Further research needs to be conducted to further verify our speculations. The promise to repay society is different from the reciprocity promise in reward-based crowdfunding. In charitable crowdfunding, the potential audiences rarely expect to be “rewarded”. In Models 2–6, we can see that the number of pictures, number of donors, average amount of donation, number of shares, and number of confirmers all have significant effects on the completion ratio. Most importantly, although neither of the variables measuring general characteristics of text such as the number of words (length of text), sentiment score of text, and sentiment score of the title has any significant effect, the dummy variables presenting different narrative strategies show varying significant impacts on the completion ratio. In all, the above results highlight the value and necessity of conducting more fine-grained text analyses in crowdfunding research.

### **5.3 Robustness check**

To assess the robustness of our findings, we further include socioeconomic status in models as the control variable. The literature has shown the close relationship between SES and health outcomes in a variety of social contexts<sup>[84–87]</sup>. In their groundbreaking study, Link and Phelan<sup>[88]</sup> conceived SES as a fundamental cause of health outcomes primarily because SES implies “access to resources ... that help individuals avoid diseases and their negative consequences through a variety of mechanisms”. Financial protection is a key resource to improve health outcomes. The relationship between SES and access to financial resources can be understood through network theory. According to Granovetter<sup>[89, 90]</sup>, networks provide access to diverse information and potentially influential others. For online medical crowdfunding, a high SES is rewarded by greater cultural and social capital, which may lead

to a better crowdfunding outcome<sup>[38]</sup>.

Education, income, and occupation are the most common indicators of SES. For example, the *Black Report* assesses inequalities on the basis of a classification of the British population into six social classes<sup>‡</sup>. In Section 5.1, we have presented occupations of fundraisers to show whether OMC ameliorates the differentiated financial protection of basic health insurance for different populations. We here follow the *Black Report* to use occupation to assign SES for two reasons. First, the education system in China has changed greatly over time, so there is little comparability among different age cohorts. Second, income data are scarce in the database, while occupations are more prevalent in solicitation text. We infer the patient's SES from keywords representing occupation extracted from text. It is worth noting that the text may mention other family members' occupations; we therefore regard solicitation as a family behavior. The occupations mentioned in the text imply potential social resources that the patient can access, so we extracted all keywords mentioned in the text of occupation. We then construct an ordinal variable and assign the values 1–4 to indicate occupation-based SES. If there is more than one occupation mentioned in the text, we select the highest-paying one to determine the patient's SES. Even controlling for the SES variable, the significant effects of those three narrative strategies are consistent. When we include the interaction of SES and the use of optimism expression, we find it has no effect, indicating the positive influence of optimism expression is unrelated to SES. This means that, no matter what her/his socioeconomic status is, the initiator will benefit from expressing optimism to receive more donations.

The second way to corroborate our findings is to include more detailed illness types in the models. In the models above, we differentiate diseases into cancer and non-cancer for the simplicity of analysis. We adopt a more precise classification of illness in a robustness check. We categorize illnesses into 17 categories according to the *Classification and Codes of Disease* (GB/T 14396—2016) and generate dummy variables

<sup>‡</sup>Occupation has historically been the most common matrix for assigning individuals' social class in Europe. The *Black Report* was published by the Department of Health and Social Security in the UK in 1980. Since its release, it has had a major impact on research into social inequalities in health<sup>[91, 92]</sup>.

for these diseases. In a separate analysis, we also examine all sampled cases, including those with a target amount of no more than 1000. The significant effects of moral mobilization, optimism, and financial burden are all consistent in various model specifications.

## 6 Conclusion and Discussion

Analyzing a sample of 50 000 or so fundraising campaigns from an OMC platform, our study leverages the computational approach to social sciences to understand OMC in China and the linkage between narrative strategies and crowdfunding outcomes. In contrast to previous studies that found OMC reinforces health disparities in other societal settings, OMC in China turns out to be more prevalent among individuals with low SES. The variety of illness types including multiple rare diseases proves the positive role of OMC as an alternative financing method for those who lack social protection or traditional financial support. In view of the characteristics of OMC that appeal to a dispersed and remote audience, we empirically examine how narrative strategies influence the outcome by extracting key phrases conveying specific meanings and emotions from solicitation text. Results show that expressions conveying optimism can increase the completion ratio, while expressions relating to financial burden and moral mobilization have negative impacts. The negative influence of stressing financial burden indicates that though initiators may feel it is necessary to underscore difficulty, potential donors often think differently. The seemingly counterintuitive negative impacts of moral mobilization may suggest that initiating OMC campaign itself is already an expression of seeking help, while moral mobilization phrases may make the audience feel morally hijacked to donate, which in turn decreases their willingness to give. Furthermore, we find that the positive influence of optimism expression is unrelated to socioeconomic status, which means that narrative strategy as a kind of media literacy is not monopolized by groups with high SES.

Our analysis of OMC in China contributes to the literature focusing on the social consequences of OMC. On one front, our analysis provides solid evidence that OMC in China provides an important alternative financing channel for the vulnerable in the health insurance system, including patients with rural origins

and those with severe or rare diseases. On another front, our research enriches the understanding of OMC by recognizing and empirically testing the influence of narrative strategies. Therefore, our study also contributes to the body of literature focusing on the persuasion effect of narrative by differentiating narrative strategies in the OMC context.

This study is not without limitations. To fully evaluate the effect of OMC in ameliorating health disparities especially those caused by SES, we would ideally control for occupation and education level, which are universal indicators of socioeconomic status. However, only 58% of fundraisers mention their occupation, and less than 5% of fundraisers mention their education level. Another deficiency is that there is no mature dictionary to measure narrative strategies. Though we construct a dictionary manually by sorting out words with high frequency, it is likely that we have missed some relevant words. Relatedly, we measure narrative strategies by extracting keywords from text, but it is possible that people convey information or sentiment at the paragraph level without using specific words. Text analysis targeting paragraph-level narrative should be employed in future analysis. Lastly, our study reveals the heterogeneous effects of different narrative strategies without looking into the network typology whereby information spreads. Future research needs to further explore network-based mechanisms of how and why certain narrative strategies influence campaign outcomes.

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