

Celebrity Philanthropy in China: An Analysis of Social Network Effect on Philanthropic Engagement

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Abstract Celebrity philanthropy is a recent but widespread phenomenon in China. Using social network analysis, this paper seeks to answer the following questions: Is a celebrity's position within a social network related to that celebrity's philanthropic engagement, and how? Does a celebrity's network position interact with normative influence to affect philanthropic engagement? What implications the study has for the development of modern philanthropy in China? Hypotheses regarding the associations between philanthropic engagement and a celebrity's social network were tested using a sample from the "Celebrity Relationship Database." Findings suggest that philanthropic engagement was more common in the center of the social network; under normative influence, a celebrity was more likely to engage in philanthropic activities if other members within the social network were active in philanthropic engagement; and, the effect of normative influence was stronger for celebrities who were positioned at the center of a social network than those who were positioned at the periphery. Implications for the development of modern philanthropy in China are also discussed.

Keywords Philanthropy · Celebrity · Social network analysis · China

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Introduction

Celebrity philanthropy is a recent but widespread phenomenon in China. Chinese press coverage using the words "celebrity philanthropy" has grown significantly since 2000 (Jeffreys 2015), and many new forms of celebrity philanthropy, such as BAZAAR Philanthropy Gala, have taken place in recent years. This phenomenon could be the result of the stated goals of the government of the People's Republic of China (PRC): to provide more social services and to create a new public culture of philanthropy (Jeffreys 2015). It could also be that celebrities, wanting to promote a better image of themselves, see charitable giving as a significant factor contributing to their personal public relations (Hwang 2010). Some scholars are critical of celebrity philanthropy, seeing it as an easy, self-serving and "unaccountable" way of obtaining publicity and staying famous (e.g., Kapoor 2013).

Nevertheless, celebrity philanthropy leverages "fame" and helps raise public awareness of philanthropic causes through media publicity. Celebrity philanthropy plays an important role in popularizing humanitarian values and global citizenship: by raising the public profile of a given social issue or its host organization or both, by attracting extra media coverage and new audiences, and by demystifying social issues, encouraging sponsorship, and raising public awareness (Bishop and Green 2008). Given celebrities' local and sometimes global networks, including fan bases, celebrity philanthropy also has great potential for generating power and spaces for social and civic action in China.

Valuing the role of celebrity philanthropy in the development of modern philanthropy is of great importance in China. Philanthropy, as a virtue, was part of China's culture for 3000 years. However, popular philanthropy was

legally abolished in mainland China after the establishment of the PRC in 1949, as it was regarded as a tool serving for Feudalism and Capitalism. Influenced by the Reform and Opening Up of late 1970s, philanthropy in mainland China was brought back to life gradually. After 38 years of development, popular philanthropy flourished during the run-up to the Beijing Olympic Games and in the aftermath of the Wenchuan Earthquake in 2008. At that point, the nation's transformation to modern philanthropy really began. In 2016, the implementation of the Charity Law marked the era of rule by law for philanthropy in mainland China. As the development of philanthropy in mainland China was interrupted for around 30 years and modern philanthropy has lagged accordingly, it calls urgently for maximizing star power to promote philanthropy in China.

People are embedded in social networks and so is their philanthropic behavior (Putnam 2000). In China, the effect of a celebrity's social network on philanthropic behavior could be particularly strong. As Fei (1992) suggested, the unspoken rule of *guanxi* plays an important role in the everyday lives of Chinese people. In addition, social network-based fundraising is becoming more and more popular, and it is distinct from traditional fundraising activities. First, potential donors may be directly solicited by someone in their social network. This personal, or peer-to-peer, fundraising differs from other types of fundraising, as the recipient has a pre-established connection with, and is therefore more likely to trust the solicitor (Schervish and Havens 1997; Long 1976). Further, social media allows nonprofits or other fundraisers to employ crowdfunding, thereby reaching geographically dispersed people around the globe using the personal networks of interested social media users (Saxton and Wang 2013). What's more, a prospective donor's response to the solicitation is open to the public because the request for a donation is tied into the social networking application (Saxton and Wang 2013). This creates peer pressure as social network members often feel pressure to donate (Meer 2011).

Given the above integration, understanding how the "social network effect" drives philanthropic behavior is an urgent task. Numerous studies have assessed the relationship between a person's philanthropic behavior and social network as a component of social capital. Social capital is regarded as a multifaceted concept, which consists of social network, social trust and norms of reciprocity (Putnam 1995). Brown and Ferris (2007) interpret social capital as network-based social capital and norm-based social capital and find that network-based social capital, in terms of involvement in formal groups, impacts both secular giving and religious giving. Brooks (2005) measures social capital as civic group involvement, social trust and political engagement and finds that these three aspects of social capital make people generous. Saxton and Benson (2005)

find that community residents' political engagement and bridging social ties have significant impacts on the growth of nonprofit organizations in a community. Further, Wang and Graddy (2008) investigate four indices of social network including: (1) bridging social networks, in terms of different kinds of personal friends the respondent has; (2) informal social networks, in terms of number of times the respondent interacts with relatives, friends and co-workers outside of work; (3) civic engagement, in terms of different types of formal groups in which the respondent is involved; and (4) organized group activism, in terms of the number of times the respondent attended organized group activities. They find that bridging social network and civic engagement increase the amount of religious and secular giving, and organizational activism only affects secular giving.

As we can see, the social networks measured in relevant studies are mostly either analyses of civic group involvement or activism, or analyses of the different kinds of personal friends the individual respondent had or the amount of interactions between them. None of the existing studies have mapped charitable behavior across social networks using social network analysis (SNA) nor examined the network per se. SNA is an evaluation approach that uses mathematics and visualization to represent the structure of relationships between people (Hoppe and Reinelt 2010), which is the most important difference with other forms of analysis on social connections. In contrast to the analysis of the attributes of individuals, SNA is able to identify individuals' structural position and influence within social networks, which more explicitly reveals social network effects.

The most fundamental axiom in SNA is that a node's (or individual's) position in a network determines in part the opportunities and constraints that it encounters; in this way, position plays an important role in a node's outcomes (Borgatti et al. 2009). In this case, the outcome is philanthropic engagement. Furthermore, a social network consists of two elements: individuals (nodes) and the relationships (social ties) between them. Once all the nodes and ties are known, one can map the network and discern every person's position within it.

Using network analysis and a sample of Chinese celebrities in the entertainment industry, this study aims to address the research gap in this area and answer the following questions: Is a celebrity's position within a social network related to that celebrity's philanthropic engagement, and how? Does a celebrity's network position interact with normative influence or peer pressure to influence philanthropic engagement? What implications the study has for the development of modern philanthropy in China?

Following this introduction, this paper describes its theoretical framework by introducing the various

conceptions of celebrity philanthropy. The extant literature regarding the associations of philanthropic engagement with social networks and demographic variables is then reviewed and used to help form the paper's hypotheses. Next, the celebrities' network structural measurements are calculated using social network analysis, and the study's hypotheses are tested through quantitative analysis using "Celebrity Relationship Database." Finally, the study demonstrates how the social network effect could be valued in the development of modern philanthropy in China and how to maximize star power as a means of philanthropic motivation.

Theoretical Framework and Hypotheses

Celebrity Philanthropy

Defining a contemporary celebrity is not a simple task. Contemporary celebrities are dual objects of "worship" (media and fan approval) and "notoriety" (media and fan disapproval/scandal), depending on whether their fame, which is subject to ongoing reassessment, is viewed as being based on innate talent or as an effect of media exposure, especially the media-fed trivia of lifestyle and personality (Turner 2004 p. 3–4; Redmond and Holmes 2007 p. 8). As there are many forms of celebrity, this term is understood both as an industry-coordinated "media process" and "bonding" and as a commodity, sign or text that is "productively consumed by audiences and fans" (Turner 2004 p. 20).

According to Jeffreys (2015), the word "philanthropy" originally referred to God's love of humankind, but now it refers to the secular love of humanity as demonstrated through "the disposition or active effort to promote the happiness and well-being of others," especially by donating time, money, goods, or services to "good causes." Practitioners usually describe modern philanthropy in positive terms as referring to the development of the not-for-profit or non-governmental sector and hence as an institutionally channeled and business-style response to the "big" issues affecting humankind (Bishop 2007; Payton and Moody 2008).

In this study, celebrity philanthropy refers to the behaviors of celebrities that are done for charitable purposes. Thus, celebrity philanthropy has two characteristics: media exposure and a fan base. But there are diverse forms of celebrity philanthropy behaviors. Examples include a charitable donation, a free performance for charitable purposes, volunteer work, a free endorsement of a charity, or fundraising for charitable purposes.

Network Effect and Philanthropic Engagement

DiMaggio and Garip (2012) suggest three classes of network effects influencing practice adoption: local network externalities, social learning, and normative influence. They argue that network externalities operate when the value of a practice depends on the number of prior adopters. Positive network externalities exist if the benefits (or marginal utility) are an increasing function of the number of other users. Information and communication technologies obtained from access to one's network constitute the classic example of network externalities (Varian and Farrell 2004). Social learning effects operate when network peers provide information that increases the utility of a new practice or reduces its cost or risk. As we can see, both network externalities and social learning have close links with information access. Normative influence as another mechanism of network effect operates through social side payments: rewards bestowed on adopters and sanctions exacted on non-adopters by their peers (DiMaggio and Garip 2012). To summarize, information access and normative influence constitute two major mechanisms of network effects that influence practice adoption.

Information Access, Network Centrality and Philanthropic Engagement

As mentioned above, the access and passage of information through networks play essential roles in practice adoption. Important individuals or centrally located individuals within social networks are more likely to possess great advantages in accessing information and resources; they also tend to have stronger control over resource and information acquisition (Lee 2014). Network centrality is a key measure assessing the importance of individuals in relationships. It indicates the most influential person(s) in a social network. Individuals who are at the center of their networks are often more socially active, closer to others within their broad social network, and have more connections with other central members in the network (Faust 1997). Network centrality can also indicate one's popularity or acceptance within a network (Freeman 1979). In other words, network centrality indicates which individuals are the most connected within a network and is often correlated with their ability to influence others, as well as their tendency to be influenced.

Individuals' ability of information access varies across four indices of social network, namely broadness and closeness of social connections, individuals' structural position and influence within social networks as the following parts will discuss. Accordingly, we investigated four standard measures of network centrality, respectively: degree centrality, closeness centrality, betweenness

centrality, and eigenvector centrality. All the measures indicate individuals' different resource acquisition and information passage abilities within a social network, which lead to different outcomes for philanthropic engagement.

Broadness of Social Network and Philanthropic Engagement

Individuals with more extended networks are more likely to engage in charitable activities (Bekkers et al. 2008; Brown and Ferris 2007; Bryant et al. 2003; Wiepking and Maas 2009). This has been explained by referring to the resources people can access through their networks (Brooks 2005; Brown and Ferris 2007; Granovetter 1973). Having a larger and more diverse social network enables easier access to charitable markets, decreasing the transaction costs of donating (Bryant et al. 2003). In addition, people with more extended social networks will more easily receive information about charitable organizations, or be solicited for donations to these charitable organizations (Brown 2005). In other words, an extended network contributes to one's chances of being asked to donate, enhances one's sense of connectedness to certain organizations, and therefore increases charitable giving.

Degree centrality measures how well connected an individual is, i.e., how many direct connections an individual has with other people. Degree centrality is simply the total number of unique social contacts that an individual has (Bonacich 1987). Therefore, we proposed the following hypothesis:

H1 An individual with higher degree centrality in a social network is more likely to engage in philanthropic activities.

Closeness of Social Connections and Philanthropic Engagement

Closely connected individual has an advantage in resource acquisition regarding philanthropic activities. As this individual tends to interact with other members within the social network more frequently, this leads to a higher probability that people who are connected are willing to share information and resources (Gentina and Bonsu 2013). Additionally, close interactions foster a sense of reciprocity and caring among people, which are deemed to be virtues that lead to philanthropy (Martin 1994).

Closeness centrality focuses on how close an individual is to all the other individuals in the network (Wasserman and Faust 1994). This measurement is based on the inverse of the shortest path lengths between an individual and all other individuals in the network. A high closeness centrality indicates that an individual is well connected to all

members of the network (Kratzer and Lettl 2009). Therefore, we proposed the hypothesis below:

H2 An individual with higher closeness centrality in a social network is more likely to engage in philanthropic activities.

The Structural Position as a “Bridge” Within Social Networks and Philanthropic Engagement

Individuals who serve as a “bridge” for the gap or “structural hole” between two network components are important for controlling the social connections within a group, as more information will pass through them (Wasserman and Faust 1994; Freeman 1979). It gives the individuals an advantage with respect to information access. Therefore, the individual will most likely receive information about charitable organizations, or be solicited for donations (Brown 2005). This provides a motivator for philanthropic engagement.

Betweenness centrality measures the share of time that an individual is between any other two individuals on a particular path over all the paths in the network. Individuals with a high betweenness centrality are important for controlling the social connections within a group. Consequently, this hypothesis was proposed:

H3 An individual with higher betweenness centrality in a social network is more likely to engage in philanthropic activities.

Influence Within Social Networks and Philanthropic Engagement

In general, a well-connected individual who is linked to others who are also well connected would be more influential than those who are linked to less-connected individuals (Wasserman and Faust 1994). The association between influence within social networks and philanthropic engagement can be explained from two perspectives. First, influential celebrities are more frequently targeted by fundraisers and more easily get access to information regarding charities and charitable activities, which raises their possibility of philanthropic engagement. Second, influential celebrities may feel a higher level of social pressure due to intense attention from social network members as well as from society. In this capacity, the desire to obtain publicity and stay popular could drive their philanthropic activities as a way to promote a better image (Kapoor 2013; Hwang 2010).

Eigenvector centrality is the measure that offers insights on the influence of a node in a network. It assigns relative scores to all nodes within the network based on the concept that a connection to a high-scoring node contributes more

than an equal connection to a low-scoring node to the score of the node in question. In other words, a person is important if he is linked to other important people. Thus, the following hypothesis was proposed:

H4 An individual with higher eigenvector centrality in a social network is more likely to engage in philanthropic activities.

Normative Influence and Philanthropic Engagement

Normative influence is another principal mechanism of network effects on human behavior (DiMaggio and Garip 2012). When people actively engage in networks of people with more positive norms regarding charitable giving, they tend to act according to those norms (Barman 2007; Wieping and Maas 2009). This is in line with Durkheim (1952)'s famous study on suicide, people who are more integrated into intermediary groups with specific norms will be more inclined to act according to the norms of these groups.

Bernheim's (1994) model of conformity suggests that individuals care about how others perceive them and strive to behave within social norms. Becker (1974) claims that in interpersonal interactions, "apparent 'charitable' behavior can be motivated by a desire to avoid the scorn of others or to receive social acclaim" (p. 1083). Reyniers and Bhalla (2013) point out that peer pressure "shames" individuals for making smaller donations. Meer (2011) argues that alumni are more likely to give and give larger amounts when they are solicited by someone from their social network.

It indicates, influenced by peer pressure, an individual is inclined to follow the positive or negative norms regarding charitable giving accepted by network members. In other words, for an individual, if there is a larger amount of social network members engaging in philanthropic activities, the individual is more likely to engage in philanthropic activities. Consequently, we propose a hypothesis as below:

H5 If there is a higher percentage of social network members engaging in philanthropic activities, the individual within the social network is more likely to engage in philanthropic activities.

Further, peer pressure could have a stronger effect for people who are positioned at the center of the social network than those who are socially peripheral. Allen et al. (2005) suggest that peer pressure is greatest among those who are more popular as they are most attuned to the judgments of their peers, making them more susceptible to group pressures. As an individual with a higher network centrality has more social connections, is closely linked to

others in the social network, is more influential, and frequently serves as the bridge between different individuals, this individual would have a greater tendency to conform and act according to the network's social norms. Therefore, we proposed:

H6 For an individual with higher network centrality, if there is a higher percentage of social network members engaging in philanthropic activities, the individual is more likely to engage in philanthropic activities.

Philanthropic Engagement and Demographic Characteristics

Personal characteristics could also affect an individual's philanthropic engagement. Important demographic variables—age, gender, education, and the region that respondents come from—were investigated as control variables.

Age

There are different opinions regarding the associations between age and philanthropic engagement. Some studies suggest that age positively affects both the capacity and inclination to give (e.g., Wang and Graddy 2008). Younger people are less likely to give than middle-aged people, because they are, for example, less integrated in church activities, and because of their limited financial resources, while older people are more inclined to give than middle-aged people due to their larger social resources, assets, as well as more experience and exposure to philanthropy, such as church attendance (Schervish and Havens 1997). Other studies suggest that the relationship between age and the probability of giving and volunteering is an inverted U shape, increasing in the early part of the life cycle before declining (e.g., Brown and Ferris 2007). When considering the media exposure given philanthropic engagement, the visibility of such engagement would likely drop as an individual's age increases because younger generations make more use of different media than older generations (Pfeil et al. 2009).

Gender

Empirical studies using survey data have found that women are more likely to donate than men (Andreoni et al. 2003). It could be due to the significant gender differences in attitudes and beliefs about caring and empathy (Andreoni and Vesterlund 2001; Hoffman 1977). In addition, females are more active because they "traditionally have carried the burden of much of the volunteering, especially for those

activities serving children and the elderly” (Bryant et al. 2003 p. 44).

Education

Higher educated people are more likely to donate. One explanation is that educational achievement enables people to develop a more pro-social attitude toward situations or people not directly related to themselves (Brown and Ferris 2007). Alternatively, Bekkers and De Graaf (2006) argue that this effect is mainly due to the greater financial resources that highly educated people have access to, and to their higher cognitive abilities and stronger verbal abilities; a person with a higher cognitive ability is better able to understand the needs of distant others. Brown (2005) suggests that education can expand a person’s information set, develop consumption-oriented human capital that makes giving more pleasurable, confer status that is linked to obligation, reduce earnings risks by developing general human capital, and reduce the cost of acquiring social capital. In addition, people with more formal education are more willing to trust that donations will be spent well, which also increases their probability of donation (Wiepking and Maas 2009).

Region

Individual philanthropic engagement is usually affected by social, political, cultural, and historical environment (Adam 2004). Chinese celebrities from mainland and outside of mainland China including Hong Kong, Macau, and Taiwan may have different philanthropic behavior. As introduced in the beginning of this study, unlike Hong Kong, Macau, and Taiwan, the development of philanthropy in mainland China was interrupted for around 30 years by late 1970s, and modern philanthropy experienced a late start. In contrast, the stable environments provided for philanthropy development for celebrities from Hong Kong, Macau, and Taiwan, could have helped them to be more likely to engage in philanthropic activities.

Data and Methods

Sample

In this study, analyses were undertaken using a sample from the “Celebrity Relationship Database.” The sample was collected in three steps. First, we obtained the basic information and social relationships of 2692 movie stars and TV stars from the “1905 movie star relationship database.”¹ Second, we gathered the personal information of all the 2692 stars, and then captured 14,523 individuals

who were connected to the stars through Baidu Encyclopedia using custom Python code from October to November of 2016. These individuals were co-workers of the 2692 stars. In total, we captured 17,215 entertainment celebrities online. The links between different celebrities, or egos, were established if they shared work experiences in the same film, or TV series and entertainment programmes. There were 116,226 undirected relationships in our “Celebrity Relationship Database.” The structure and pattern of the network are presented in “Appendix 1.” Finally, 5000 individuals were randomly selected from the Chinese celebrities collected in order to explore the associations of social networks and philanthropic behaviors. All of the people within this group were included in the sample because their record of philanthropic behaviors was publicly available and easily accessible on Chinese Web sites.

Using custom Python code, we gathered information online regarding the philanthropic behaviors of all the 5000 Chinese celebrities. First, using Chinese language keywords including “donation” (juanzeng), “giving” (juankuan), “free performance for charitable purposes” (yiyan), “voluntary” (zhiyuan), “caring” (aixin), “charitable foundation” (jijinhui), “fundraising” (mujuan), and “philanthropy” (cishan), we captured the publicized record of philanthropic engagement of all the celebrities on the Web site of, for example, Baidu Encyclopedia, news stories, links and webpages mentioning their philanthropic activity. And then, the demographic information of the sample was gathered from Baidu Encyclopedia and other websites. The demographic variables are age, gender, educational level, and region (mainland or not mainland). In the end, reliable information for 4196 celebrities above 18 years old was obtained for this study. There were 42,476 undirected links among them. The structure and pattern of Chinese celebrities’ network is presented in “Appendix 2.”

Measures

Dependent Variable

The dependent variable was philanthropic engagement. It was measured with an item: “Have the celebrity participated in philanthropic activities?” Philanthropic activities were donations, free performance for charitable purposes,

¹ Please see <http://www.1905.com/mdb/relation/>. “1905 movie star relationship database” is a sub-database of “1905 Movie Web” founded in 2004. It is the official database of Channel 6 of China Central Television (CCTV6). It is regulated by the State Administration of Press, Publication, Radio, Film and Television of the People’s Republic of China (SAPPRFT). All the information about movie stars in the database is valid and reliable.

volunteer work, or fundraising and advocacy for charitable organizations. The options were: yes (coded as 1) and no (coded as 0).

Independent Variables

Percentage of social network members engaging in philanthropic activities (PMP) was the amount of people having experiences of philanthropic engagement within one's social network divided by the total amount of people the individual was linked to. Age was a continuous variable. Education level was measured with an item: "Is the celebrity highly educated?" A celebrity with a bachelor's degree or above was coded as 1 (yes), otherwise it was coded as 0 (no). Gender was a dummy variable including two values: female (coded as 0) and male (coded as 1). Region was also a dummy variable with two values: mainland (coded as 1) and not mainland (coded as 0).

The four standard measures of network centrality, namely degree centrality, closeness centrality, betweenness centrality, and eigenvector centrality, were calculated using social network analysis.

Analytical Methods

First, network centrality measurements for each individual in the sample were calculated using Gephi 0.9.1, a professional tool for social network analysis. Subsequently, descriptive analysis and binary logistic regression analysis were undertaken. It should be noted that the four measures of network centrality were investigated in four regression models, respectively. Using Gephi 0.9.1, associations of philanthropic engagement and social network were mapped visually. SPSS 23.0 was employed for data entry, descriptive analysis, and regression analysis.

Analysis Results

Descriptive Analysis

Social network analysis shows the average number of social connections (degree centrality) per individual was 20.25 (SD = 25.83), the median was 10, and the mode was 2. Average betweenness centrality was 4679.19, average closeness centrality was 0.31, and average eigenvector centrality was 0.08. Among the respondents, 29.55% had experiences of philanthropic engagement, 54.81% were males, 76.75% had obtained at least a bachelor's degree, and 66.03% came from Mainland China (see Table 1).

We categorized individuals as either centered or peripheral (above or below the average score of the four centrality measures). Figure 1 shows that celebrities with a

Table 1 Descriptive analysis

	Percentage (%)	Mean	SD
Degree centrality		20.25	25.83
Betweenness centrality		4679.19	11426.79
Closeness centrality		0.31	0.04
Eigenvector centrality		0.08	0.12
PMP		0.43	0.24
Age		44.87	14.42
Gender			
Male	54.81		
Female	45.19		
Education			
Highly educated	76.75		
Not highly educated	23.25		
Region			
Mainland	66.03		
Not Mainland	34.97		
Philanthropic engagement			
No	70.45		
Yes	29.55		

PMP is percentage of social network members engaging in philanthropic activities

higher network centrality were more likely to engage in philanthropic activities. To be specific, philanthropic behavior was both more prevalent and more likely to be shared among those who were scored high (above the mean) for the four centrality measures, respectively; and charitable activities were less likely for people who were scored low (below the mean) for the four centrality measures, respectively. Chi-square test indicates that the differences were statistically significant ($P < 0.001$).

Using Gephi 0.9.1, we mapped philanthropic engagement across social networks. Figure 2 shows that people who have engaged in philanthropic activities had more social connections than those who had not engaged in philanthropic activities. For example, Liang Chaowei and Liu Qingyun who are actors from Hong Kong, have engaged in philanthropic activities. The number of their social connections was obviously larger than those of Lv Fang and Jia Ling from Mainland China, who have not engaged in philanthropic activities at that period of time.

Moreover, philanthropic engagement is a collective phenomenon under normative influence. Figure 3 suggests that an individual was more likely to engage in philanthropic activities if philanthropic engagement was more common within his social network. For example, Gao Yuanyuan, who is an actress from Mainland China, engaged in philanthropic activities. Within her social network, 64% of the nodes she connected to also had experiences of philanthropic engagement at the period of time.

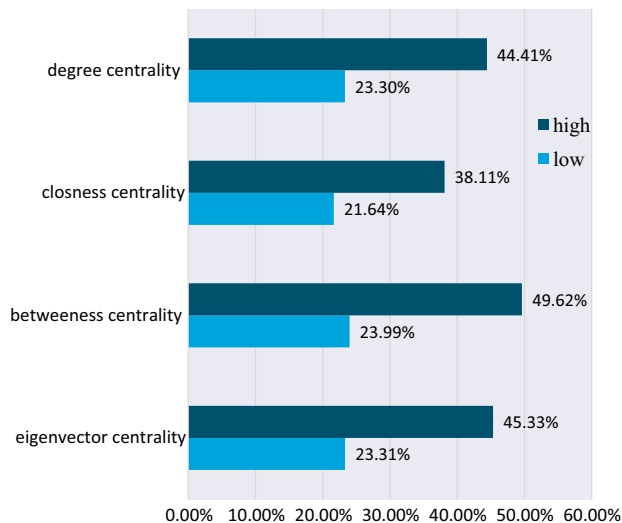


Fig. 1 Percentage of respondents who have engaged in philanthropic activities within the high/low level of centrality measures

In contrast, Sun Feihu, who is an actor from Mainland China, had not engaged in philanthropic activities, and most of the nodes within his network also did not have experiences of philanthropic engagement.

Binary Logistic Regression

In order to examine the extent of the network effect's association with the probability of celebrity philanthropy, binary logistic regression models were used. Network centrality measures, PMP (percentage of social network members engaging in philanthropic activities), age, gender (male as reference), education (highly educated as reference), and region (Mainland as reference) were included in the model (See Table 2).

As shown in Model 1, females had a significantly higher probability of engaging in philanthropic activities compared to males; the chance of philanthropic engagement (exposed via social media) significantly dropped with the increase in individuals' age, and the effect of education and region (whether from Mainland China) was not statistically significant. Model 1 explained 2.2% of the variance of philanthropic engagement.

After including network centrality in Model 2 to Model 5, the pseudo R^2 increased massively. Degree centrality, closeness centrality, betweenness centrality, and eigenvector centrality were significantly related to philanthropic engagement in the four models, respectively. To be specific, with the increase in degree centrality by 1 unit, the chance of engaging in philanthropic activities increased 2.1% (see Model 2–1); the higher the closeness centrality, betweenness centrality, and eigenvector centrality, the higher the chance of engaging in philanthropic activities

(see Model 3–1, Model 4–1, and Model 5–1). Thus, H1, H2, H3, and H4 were valid.

Additionally, Model 2–2, Model 3–2, Model 4–2, and Model 5–2 suggested that when a higher percentage of an individual's social network members engaging in philanthropic activities (PMP), there was a significantly higher probability that an individual would engage in philanthropic activities. To be specific, with the increase in PMP by 1 unit, the chance that an individual would engage in philanthropic activities increased around 112 to 144%. Thus, H5 was valid.

Further, the interaction of network centrality and PMP was significantly related to philanthropic engagement (see Model 2–3, Model 3–3, Model 4–3, and Model 5–3). For an individual with a higher network centrality, if there were a higher percentage of social network members engaging in philanthropic activities, the individual was more likely to engage in philanthropic activities. Thus, H6 was supported.

Results displayed in the five models indicated that celebrities' probability of philanthropic engagement was a function of the ego's network centrality, age, gender, percentage of social network members engaging in philanthropic activities and its interaction with network centrality.

Conclusions, Implications, and Limitations

Conclusions

This study investigated two major mechanisms of network effect on celebrities' philanthropic engagement in China. Social network analysis enables us to take one step further to map philanthropic behavior across social networks and to examine the individuals' position within networks. First of all, findings supported that individuals who were centrally located within social networks had an advantage in information access that played a key role in philanthropic behavior. Findings show that individuals who had more social connections, who had closer relationships with network members, who served as the "bridge" over structural holes in a network more frequently, or who were more influential within social networks, were more likely to engage in philanthropic activities. As indicated by the general theory of social capital, whom a person is connected to, and how these contacts are connected to each other, enable people to access resources that ultimately lead them to different opportunities and outcomes.

This study also supported the other major mechanism of network effect on philanthropic engagement: normative influence. Under peer pressure, a celebrity was inclined to follow the positive or negative norms regarding charitable giving accepted by network members. Philanthropic

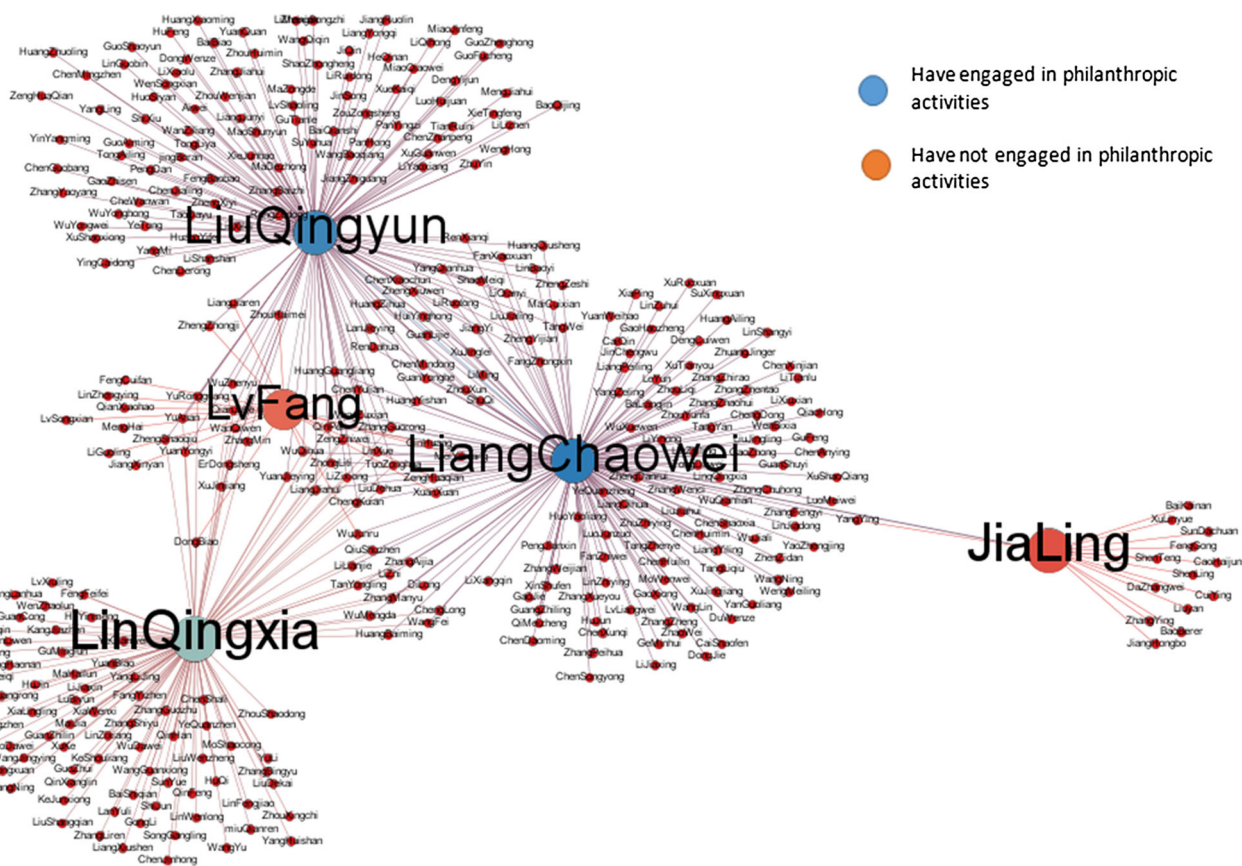


Fig. 2 Map degree centrality and philanthropic engagement (Examples). *Note* This figure focuses on five egos (the big nodes), and all the alters (the small nodes) could be connected to each other as shown in

engagement was more common among celebrities who were more active in philanthropic engagement. In other words, the higher the percentage of social network members engaging in philanthropic activities, the higher the probability for an individual engaging in philanthropic activities. Additionally, the effect of peer pressure was even stronger for individuals who were positioned at the center of the social network than those who were positioned at the periphery. In other words, there was some interplay between network centrality and peer pressure when influencing philanthropic engagement.

There were other factors contributing to celebrities' philanthropic behaviors. Gender and age were significantly related to philanthropic engagement. However, education level was not associated with philanthropic engagement. Although evidence supporting the relationship between education and philanthropic behaviors is abundant, this relationship was not valid for the celebrities in this study. It could be due to the effect of media exposure. When considering the media exposure that comes with a celebrity's philanthropic engagement, the visibility of such

Appendices 1 and 2. However, in order to clearly display links between egos and alters, connections between alters are not presented in this figure

engagement may not be influenced by the celebrity's education. This aspect of celebrity engagement is therefore ripe for future studies.

Moreover, although the environment of philanthropy in Mainland China is different from other regions of China (Hong Kong, Macau and Taiwan), analysis results show that those differences did not necessarily lead to significant differences regarding modern celebrity philanthropy between mainland China and other regions of China. Under authoritarian governance, the government remains the most decisive component in the development of philanthropy in mainland China (Yang et al. 2016). Since the Hu–Wen Administration began in 2002, philanthropy has been rendered as a complementary and supplementary part of the nation's social relief system and obtained strong policy support. In addition, the rapid growth of the economy in recent years, including the increasing incomes of residents and the flourishing of the entertainment industry, has laid the material foundation for the development of celebrity philanthropy in mainland China. Although philanthropy was interrupted for 30 years, this study's results appear to

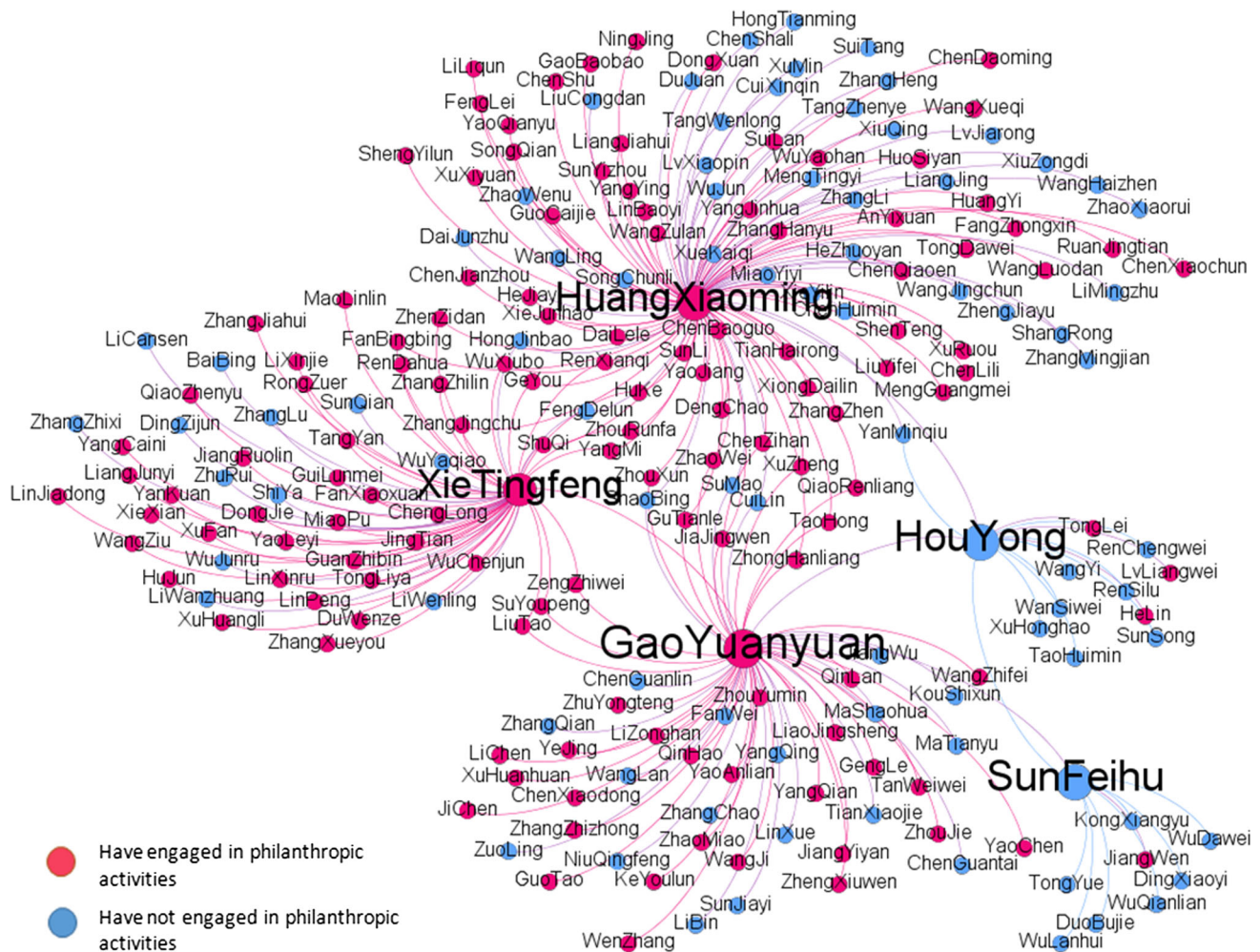


Fig. 3 Map normative influence and philanthropic engagement (Examples). *Note* This figure focuses on five egos (the big nodes), and all the alters (the small nodes) could be connected to each other as

shown in Appendices 1 and 2. However, in order to clearly display links between egos and alters, connections between alters are not presented in this figure

show that modern celerity philanthropy in mainland China did not lag significantly far behind the other regions in China.

At this point, it is important to state the obvious: celebrity has unique features. This group of people tends to receive a relatively high status of fame and public attention accorded by the mass media. They are often associated with wealth, as fame often provides opportunities to make money. Therefore, this group of people could have a higher level of income on average. Meanwhile, although the term “celebrity” is often intended to refer to famous individuals, it is also commonly used to refer to anyone who has had even moderate public attention in the media, regardless of time point. Thus, this group of people may feel a higher level of social pressure due to public attention that could

drive their philanthropic activities. Social network effect, age and gender were associated with philanthropic engagement for both celebrities and general people (Brown and Ferris 2007; Brooks 2005; Wang and Graddy 2008; Andreoni et al. 2003); this demonstrates the solidarity of the associations and the validity of network effect, age, and gender, as important factors of philanthropic behaviors.

To summarize, although there are many factors of philanthropic engagement, whether an individual engages in philanthropic activities also depends on whether others in the individual’s social network participate in such activities. Our social network analyses suggest that philanthropic engagement was more common in the center of the social network, among individuals who were more active in philanthropic engagement. Philanthropic engagement, in

Table 2 Logistic regression models of philanthropic engagement and its factors

IVs	Model 1		Model 2		Model 3		Model 4		Model 5			
	M1-1	M2-2	M2-3	M3-1	M3-2	M3-3	M4-1	M4-2	M4-3	M5-1	M5-2	M5-3
DC	1.021*** (0.021)	1.020*** (0.020)	0.989+ (- 0.011)									
CC				677502.982*** (13.426)	424866.048*** (12.960)	2092.573* (7.646)						
BC							1.000046*** (0.000046)	1.000046*** (0.000046)	0.999954* (- 0.000046)			
EC										97.026*** (4.575)	86.584*** (4.461)	0.206 (- 1.579)
PMP		2.435*** (0.890)	1.442+ (0.366)		2.125*** (0.754)	0.078 (- 2.545)		2.433*** (0.889)	1.950*** (0.668)		2.179*** (0.779)	1.506* (0.410)
DC by PMP			1.070*** (0.068)									
CC by PMP						80969.457* (11.302)			1.000202*** (0.000202)			
BC by PMP												
EC by PMP												332394.498*** (12.714)
Age	0.984*** (- 0.016)	0.976*** (- 0.024)	0.978*** (- 0.022)	0.978*** (- 0.022)	0.980*** (- 0.020)	0.981*** (- 0.019)	0.978*** (- 0.023)	0.980*** (- 0.020)	0.982*** (- 0.018)	0.975*** (- 0.026)	0.977*** (- 0.023)	0.979*** (- 0.021)
Male	0.796** (- 0.228)	0.747*** (- 0.292)	0.731*** (- 0.314)	0.789** (- 0.236)	0.783*** (- 0.245)	0.779** (- 0.250)	0.742*** (- 0.299)	0.735*** (- 0.308)	0.725*** (- 0.321)	0.765** (- 0.268)	0.759** (- 0.276)	0.754*** (- 0.282)
Education	0.930 (- 0.072)	0.933 (- 0.069)	0.922 (- 0.081)	0.894 (- 0.112)	0.899+ (- 0.107)	0.893 (- 0.113)	0.959 (- 0.042)	0.965 (- 0.036)	0.947 (- 0.054)	0.955 (- 0.046)	0.959 (- 0.042)	0.940 (- 0.062)
Mainland	0.865 (- 0.145)	0.905 (- 0.100)	0.892 (- 0.115)	0.830 (- 0.186)	0.824 (- 0.194)	0.834 (- 0.182)	0.915 (- 0.089)	0.901 (- 0.104)	0.931 (- 0.072)	0.894 (- 0.112)	0.884 (- 0.124)	0.919 (- 0.084)
Constant	1.371 (0.315)	1.160 (0.149)	0.706+ (- 0.199)	0.025*** (- 3.690)	0.019*** (- 3.960)	0.085** (- 2.460)	1.331 (0.286)	0.818 (- 0.201)	0.826 (- 0.191)	1.259 (0.230)	0.823 (- 0.195)	0.889 (- 0.117)
Pseudo R ²	0.022	0.111	0.121	0.090	0.097	0.098	0.095	0.109	0.118	0.112	0.120	0.126

Coefficients of independent variables are in brackets, above them are exponent of individual coefficient

DC degree centrality, CC closeness centrality, BC betweenness centrality, EC eigenvector centrality, PMP percentage of social network members engaging in philanthropic activities

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$; + $P < 0.1$

other words, was not merely a function of individual experience or individual choice but was also a property of the groups of people involved. Indeed, changes in an individual's philanthropic engagement can ripple through social networks and generate large-scale structure in the network, giving rise to clusters of active and inactive individuals. In other words, philanthropic engagement, like happiness and health, is a collective phenomenon.

Implications

This study explored celebrity philanthropy from a non-Western context and has important implications for mobilizing philanthropic engagement in mainland China giving her lagged development of modern philanthropy since late 1970s. First of all, the social network effect should be highly valued in the process of mobilizing philanthropic engagement in mainland China. In Western countries, philanthropy has historical links to religion. Deep religious faith and, in particular, the great evangelical revival acted as very important motivating factors for charitable donation (Whelan 1996). Diverse from Western countries, philanthropic behavior of Chinese people may strongly rely on their social connections instead of religion. As Yum (1988) pointed out, East Asian communication patterns emphasize on social relationships as opposed to the North American which emphasize on individualism. This East Asian preoccupation with social relationships stems from the doctrines of Confucianism, which considers proper human relationships to be the basis of society. In other words, social networks could play a key role in the spread of philanthropic behavior among Chinese people, which is supported by the findings of this study.

Consequently, to better motivate philanthropic engagement for celebrities, it requires understanding the dynamic spread of philanthropic engagement. The clusters of people who are active in philanthropic engagement could be the result of the spread of this influence and not merely the result of a tendency for like-minded people to associate together. To monitor how philanthropic behaviors spread within a social network, it is necessary to locate those individuals with certain positional advantages derived from the way they are embedded in neighborhoods or other social structures. Equally important, as philanthropic behavior is a collective phenomenon, charitable giving needs to be more visible—the more people see that their peers are giving, and how much they give, the more likely they are to give or give more themselves. It would be helpful for cultivating pro-philanthropy norms within social networks or even in the broader society.

This study also has implications on the value of celebrity philanthropy in China. For celebrities, efficiently motivating their philanthropic engagement is of great

importance. On the one hand, as celebrities tend to have a higher level of income, they are capable of donating more. In other words, this group of people has greater potential to make a bigger contribution to philanthropy in China. On the other hand, celebrities are fan based, and they have a strong modeling effect on their fans. Particularly given the increasingly powerful “fan economy” in China, celebrities could serve as important inspirations for the general public in China to contribute to philanthropy. Thus, it would be essential to maximize star power and leverage the celebrity's “fame” to raise public awareness of philanthropic causes through media publicity. Celebrities in China have an associated capacity to contribute to the expansion of the nonprofit sector through media publicity of their philanthropic donations and advocacy.

Although philanthropy in China experienced a bumpy process of development, this study suggests a bright future for modern philanthropy in China. Based on the mechanism of network effects on philanthropic engagement, the attitudes of leaders, who are positioned at the center of celebrities' social networks, toward charitable behaviors, and how they pass information would influence the charitable behaviors of the individuals they are connected to. If the “leader” (or the “bridge”) is pro-charity, the individuals connected to the “leader” are more likely to be pro-charity. In China, celebrities with a higher centrality within social networks tend to engage in philanthropic activities. This would drive more people to engage in philanthropy and help to build positive social norms. Celebrities' visible and persistent participation in philanthropic activities would improve philanthropic engagement of numerous others, both in and out of the leaders' social network in light of the fan-based character of celebrity philanthropy. It would greatly contribute to the prosperity of philanthropy in China.

Limitations and Suggestions for Future Studies

The networks in this study, like those in all network studies, were only partially observed. Therefore, there were likely measurement errors in individual network attributes. For example, we measured an individual's centrality based on the observed social network, but that same person might be highly central to an unobserved network of individuals who did not take part in the study. Meanwhile, the online information about the celebrities' philanthropic engagement was not complete. An individual celebrity could have been found to have had no experience with charitable activities but that finding could be due to the lack of such information online.

In addition, although evidence supports the association between network centrality and philanthropic engagement, the “effect” of network centrality is somewhat spurious.

For example, it has been suggested that the positive effect on charitable giving of having a more extended social network could be explained by the fact that individuals with more trust, more empathic concern, and stronger verbal abilities have more extended networks and donate larger amounts (Wiepking and Maas 2009). Likewise, social trust is particularly important in explaining the charitable behavior of those who are not well connected to others or involved in organizations (Wang and Graddy 2008). Thus, the “effect” of network extension on philanthropic behaviors could be caused by other factors not covered in this study. This highlights the necessity of further examination of these relationships. Future studies could also distinguish between money donation and time donation when examining the association between network centrality and philanthropic engagement. Different forms of philanthropic engagement could be motivated by different factors and thus may be correlated with an individual’s social network in different ways.

Moreover, the specific timing of philanthropic behavior and the building of social relationships are unknown in this study. Therefore, this study cannot address whether philanthropic behavior was the result of a celebrity’s social network or the other way around. There is the possibility that philanthropic engagement increased a person’s centrality in their social network at subsequent time points. That is, philanthropic engagement may have led to network centrality rather than the other way around. Therefore, we suggest that future studies explore the direction of the relationship between philanthropic engagement and network centrality using path analysis. A better solution may be to collect relevant data at different time points to test which one is the cause or the result. Meanwhile, we were unable to discern any associations between major disasters and the social network effect without information about specific time period of the philanthropic behavior. Thus, we suggest future studies remedy this limitation and

investigate how disasters influenced, if at all, the association between social network and philanthropic engagement.

For future studies, we also suggest differentiating the types of relationships in social networks in order to capture more perspectives. It is possible that individuals could have more than one type of relationship, such as spouses or college classmates. Future studies could include uniplexity or multiplexity of the network in the analysis with a proper sample. Although this study looked into the social distance of relationships measured by closeness centrality, future studies could go further to investigate whether the spread of philanthropic engagement was more prevalent between mutual friends or within unilateral friendships. Similarly, it would also be interesting to examine whether the spread of philanthropic engagement pertains to direct relationships (such as friends) or to indirect relationships (such as friends of friends) and whether there are geographical or temporal constraints on the spread of such activities through a social network. Different forms of the “alter” to whom the ego connected may have various impacts on the ego. However, these questions were beyond the scope of this study.

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Compliance with ethical standards

Conflict of interest Dr Yongjiao Yang has received a research grant from NSSF. The other two authors have not received any research grants. The authors declare that they have no conflict of interest.

Appendix 1

See Fig. 4.

Fig. 4 Structure and pattern of social networks in “Celebrity Relationship Database.” *Note* Different colors represent different communities in social networks. There are 17,215 nodes and 116,266 ties in the social network



Appendix 2

See Fig. 5.

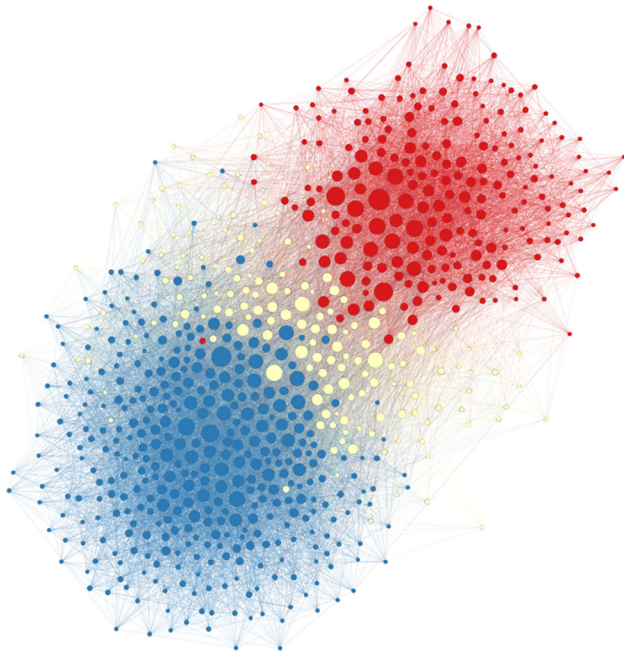


Fig. 5 Structure and pattern of Chinese celebrities' network. *Note* The nodes are selected to be presented in the figure if degree centrality is above 20. Different colors represent different communities in social networks. There are 729 nodes and 21,467 ties in the social network

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