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## Responses to a Self-Presented Suicide Attempt in Social Media:

### A Social Network Analysis

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### Abstract

**Background**—The self-presentation of suicidal acts in social media has become a public health concern.

**Aims**—This article centers on a Chinese microblogger who posted a wrist-cutting picture that was widely circulated in Chinese social media in 2011. This exploratory study examines written reactions of a group of Chinese microbloggers exposed to the post containing a self-harming message and photo. In addition, we investigate the pattern of information diffusion via a social network.

**Methods**—We systematically collected and analyzed 5,971 generated microblogs and the network of information diffusion.

**Results**—We found that a significant portion of written responses (36.6%) could help vulnerable netizens by providing peer-support and calls for help. These responses were reposted and diffused via an online social network with markedly more clusters of users – and at a faster pace – than a set of randomly generated networks.

**Conclusions**—We conclude that social media can be a double-edged sword: While it may contagiously affect others by spreading suicidal thoughts and acts, it may also play a positive role by assisting people at risk for suicide, providing rescue or support. More research is needed to learn how suicidally vulnerable people interact with online suicide information, and how we can effectively intervene.

### Keywords

attempted suicide; microblog; China; social network analysis; social media

Digital technologies and the recent development of the Internet have given rise to Web 2.0 (Oreilly, 2007) and a multitude of social media (Kaplan & Haenlein, 2010) applications (e.g., Wikipedia, YouTube, blogs, microblogs [Twitter or Sina Weibo in China], and social networking sites [Facebook/MySpace or Renren in China]). These Internet applications depart from the conventional static and noninteractive Internet sites and enable online users to create user-generated content, participate in collaborative projects, and interact and connect with their social network in real time. Social media not only enrich the content and scope of personal communication, it also facilitates uninhibited communication and selective self-presentation of undesirable behavior (Kaplan & Haenlein, 2010). From a research perspective, social media can provide an excellent platform for collecting data and studying human behaviors, especially rare behaviors such as suicide and suicide prevention (Cheng, Chang, & Yip, 2012).

The association between social media and suicide has recently become a public health concern (Luxton, June, & Fairall, 2012). Studies on suicide and the Internet emerged about a decade ago (Fu, Wong, & Yip, 2009). Several lines of inquiry have formed, with one line focused on how information about suicide methods or communication is spread through the Internet (eventually negatively impacting suicidal behavior; Fu et al., 2009; Rajagopal, 2004; Ruder, Hatch, Ampanozi, Thali, & Fischer, 2011). Another line investigates the extent to which various types of suicide-related information are accessible on the Internet (Biddle, Donovan, Hawton, Kapur, & Gunnell, 2008; Cheng, Fu, & Yip, 2011; Recupero, Harms, & Noble, 2008; Wong et al., 2013). The third line examines whether an individual's suicidal ideation is linked to Internet addiction symptoms (Fu, Chan, Wong, & Yip, 2010).

One important, yet understudied, research area is how social media affect people's communication about suicide. Suicidal people often communicate with ambiguity, being in a state between dying by killing oneself and seeking the attention and help of others (Farberow & Shneidman, 1961). However, the pattern of suicide communication may have actually changed with the advent of the Internet. Vygotsky (1978) long argued that communication tools allow for the extension of human capabilities. Communication tools include traditional analog (e.g., pens, telegraph, telephone) and digital forms, the latter having upended our traditional ways of communication. It is therefore important to investigate how computer-mediated communication differs from nonmediated or face-to-face communication with respect to the psychological processes and outcomes. Several general approaches or theories have been developed to conceptualize computer-mediated communication (Walther, 2011). For example, the hyperpersonal model presumes that an individual's online self-presentation can be a form of personal impression and relationship management that has capabilities far exceeding face-to-face communication (Walther, 1996). Through a channel of reduced communication cues and asynchronous interaction, Internet message senders may selectively present themselves in ways "that are more stereotypically desirable in achieving their social goals" (Walther, 1996, p. 28), such as managing a desirable personal image or building intimacy. On the receiving end, message receivers opt to idealize the sender and to "build stereotypical impressions of their partners with qualifying the strength of such impressions in light of the meager information" (Walther, 1996, p. 29). In the context of a suicidal act, because of their capacity to enable self-disclosure of uninhibited behavior social media may lower the threshold of vulnerable

and suicidal people. Consequently, such people may be more apt to present self-harm intentions or behaviors to a network of people, including both close friends and loose acquaintances. In the context of suicide communication, the hyperpersonal model posits that the intentions of suicidal individuals to self-harm are uninhibited in social media by allowing them to selectively present themselves crying out for help. On the receiving end, decoders have to rely on limited communication cues and personal attitudes to respond to such signals.

As of March 2013, over 200 million active Twitter user accounts are generating over 400 million tweets every day (Wickre, 2013). Although Twitter is not accessible in China, local microblogging sites, like Sina Weibo and Tencent Weibo, have rapidly grown on their own to become major channels for Chinese Internet users to read, write, communicate, and forward 140-character messages via a variety of technology platforms. These two leading microblogging service providers in China each claim their registered account base reached 500 million at the end of 2012 (Mozur, 2013). According to CNNIC (China Internet Network Information Center, 2012), the total number of Chinese microbloggers reached 274 million by mid-2012, comprising 51% of the total Internet users in China. The total number of microbloggers is estimated to reach 400 million by the end of 2014 (iResearch, 2011). As Western media put it, microblogging has emerged to become one of the major “free-speech platforms” in China (Richburg, 2011). This new medium gives Chinese Internet users unprecedented opportunities for sharing information as well as expressing opinions and emotions, thereby serving as “We the Media” (Gillmor, 2004).

This study is purposely exploratory. We seek to investigate the consequences of presenting self-harm behavior through social media. Using a case study in China, we address the following questions: (1) How do Chinese microbloggers respond to the self-presentation of self-harm behavior? (2) How are such microblog posts propagated in a social network? and (3) What are the implications for suicide prevention?

## Method

Quantitative content analysis was conducted to study a self-harm entry in a microblog in China. On February 23, 2011, at 9:56 pm, a wrist-cutting photo was posted on Sina Weibo by a user J, whose account profile indicated he was a male living in Shenzhen city. This microblog read, “Today, I returned back to you. That’s all. You made me feel like falling from heaven to hell. Now I get it.” Once published, the post and the picture attached were broadly circulated on the microblog system. About 3 hours later, another message posted by User J read, “Sorry, I am so sorry. I didn’t know my personal issue could draw so much attention here. I am fine. I have already wrapped up my wound.” According to media reports on February 25, 2011, the police confirmed User J’s real identity and his suicidal act.

On the Sina Weibo platform, users can respond to a post by two different means: reposting or commenting. When reposting, a microblogger adds a remark and sends the original post to his or her followers. A microblogger can also respond by commenting on the original post. In the case of user J’s weibo, the original post was reposted 3,974 times and received

1,997 comments by 3,696 microbloggers within 3 hours (as of February 24, 1:05 am), yielding 5,971 microblog pieces of content that we collected and analyzed.

We used the Application Programming Interface (API) provided by Sina Weibo to gather reposts and comments on March 15, 2011. Reposters' self-reported sex, follower counts, friend counts, and provinces of origin were also collected. One thousand randomly generated 10-digit user identity codes served as control subjects to represent the overall microblogger population.

In addition, user names contained in the reposts were extracted. When a microblog is reposted, a reference in the format of “//@screen\_name,” where *screen\_name* is the displayed user name, is offered by default at the beginning of the reposting text and is preserved in its entirety if not deleted by the author. We took advantage of this property to trace the pattern of reposting.

To generate a coding framework, the first author analyzed collected reposts and comments inductively, and then classified and regrouped them into an initial category framework. Two native Chinese coders were recruited to conduct the classification. After a training session, the coders provided feedback in a subsequent review meeting. The categories were amended accordingly and the final coding framework was developed. Next, 100 posts were randomly selected from the dataset and coded by two coders in a parallel and independent manner to assess intercoder reliability. The  $\kappa$  coefficient of the classification was 0.66, which can be considered to be substantial agreement (Landis & Koch, 1977). Finally, one coder completed the coding of the entire dataset using the coding framework.

Interconnections (e.g., a link between two nodes signified a repost sent from one microblogger to another) between microbloggers are represented by a directed social graph. To analyze the graph, we used R version 2.12.1 (R Development Core Team, 2010). Specifically, we used the network research package *igraph* (Csardi & Nepusz, 2006) to conduct social network analysis, evaluating the node-level parameters (e.g., in-degree, out-degree, and betweenness centrality measures), which are used to represent the importance of each individual microblogger in a network (Freeman, 1978). For example, the *out-degree centrality* of a microblogger M means the number of other microbloggers who repost M's message. The *in-degree centrality* of M represents the frequency with which M reposts messages received from others. The *betweenness centrality* of M represents the total count of pairs of nodes whose shortest path between them consists of M, thereby denoting the relative importance of the position M has in the network. Moreover, network-level topological parameters, including *average pathlength* and *global cluster coefficient*, were deployed to compare different networks (Lewis, 2009). The average pathlength of a network is equal to the average number of shortest paths over all direct paths connected between nodes in that network. The global cluster coefficient is an indicator of the extent to which the nodes of a network cluster together. Fuchterman and Rheingold's graph layout algorithm (R's *igraph* package) was used to visualize the network. Moreover, a set of social graphs was randomly generated using the Erdos-Renyi model (Csardi & Nepusz, 2006), a common approach for social network comparison (Chau & Xu, 2007).

## Results

In total 5,971 microblogs were collected and analyzed. Table 1 shows the categories of the microbloggers' written reactions. Among the collected microblogs, 36.6% concerned caring, showing empathy, and calling for help (see examples in Table 1), 23.4% evidenced a negative attitude (i.e., cynical or indifferent comments), 19.5% were emotional presentations of shock, and 20.4% were merely reposts.

Table 2 demonstrates that the repost graph evidenced a slightly shorter average path length than the group average of the randomly generated graphs, indicating that its information diffusion took a shorter distance on average to propagate the message from one node to the others. The larger global cluster coefficient of the repost graph reflects the existence of many relatively isolated and densely-knit user clusters in the network.

A total of 3,696 microbloggers reposted the message; Table 3 shows their self-reported sex, locations, and follower and friend counts. Compared to the random sample obtained from the microblogger population, the data show that people who contributed to reposting were more likely to come from cities in China that are economically well developed and top ranked in GDP per capita (National Bureau of Statistics of China, 2012). The five top ranked cities were Shanghai (1st ranked in GDP per capita, the same as below), Beijing (2nd), Jiangsu (4th), Zhejiang (5th), and Guangdong (7th). In addition, these reposters had a higher likelihood of having more than 1,000 followers and 200 friends.

In Table 4, bloggers J1 to J10 denote the top ten most influential microbloggers who participated in reposting the original weibo. They were ranked by their betweenness centrality, an indicator of its importance in the network of information diffusion. None of the top ten microbloggers made cynical or indifferent comments. Figure 1 is a graphical visualization of the information diffusion, indicating how the reposters were intercommunicated. As seen in Figure 1, the major reposters were often positioned at cluster locations of the network and linked with a large number of other reposters.

## Discussion

This exploratory study indicates that there were various types of responses from Chinese microbloggers to an individual's online presentation of self-harm. A significant portion of the responses appeared to be positive, characterized functionally by efforts of caregiving and offers of assistance to the call for help. The top 10 most influential microbloggers who reposted the original message showed concern and care for the person who self-harmed. Drawing on the hyperpersonal model (Walther, 1996), the consequence of these caregiving responses may positively address and reinforce a suicidal individual's underlying goal of self-presentation: the cry for help (Farberow & Shneidman, 1961).

Although media presentation of suicide is often considered harmful to vulnerable suicidal people (Niederkrötenhaller et al., 2012), and suicide-related communication within a cluster may be contagious (Joiner, 1999), this study and others (Ruder et al., 2011; Silenzio et al., 2009) suggest a potential positive function of social media in suicide prevention. Specifically, diffusion of messages about one's suicidal thoughts or behaviors on social

media may serve as an early identification tool and as a rescuing platform for those who are at suicidal risk or a strategy of engaging socially isolated individuals. For instance, Facebook has launched a number of initiatives to assist users in identifying others who exhibit suicidal tendencies (Ruder et al., 2011). Our findings, like those of others, suggest that online media can also be constructively utilized to detect individuals with suicidal risks earlier, thereby ensuring a speedy and timely rescue. Increasing amounts of supporting empirical evidence prompt us to wonder if it is necessary to reexamine the suicide reporting guidelines in the international media, especially given the special nature of online social media. Perhaps new guidelines should be developed specifically for online service and information providers.

Furthermore, our social network analysis shows that there were more user clusters in the repost network (i.e., larger cluster coefficient) than in the random network, and that the speed of information diffusion was faster (i.e., shorter average pathlength), suggesting that a repost network can be activated quickly for effective communication in emergency situations. It also suggests that loose acquaintances, known as “weak ties” (Granovetter, 1973), might be more helpful than a closed group within an interpersonal network in terms of responding to emergencies such as suicide attempts. Recent studies on social media information diffusion demonstrate that removing weak ties from the network considerably decreases the effectiveness of information diffusion (Zhao, Wu, & Xu, 2010). A weak-ties network via social media may therefore effectively contribute to the early identification of people at risk from the population at large. Therefore, if suicide prevention professionals or organizations can build up an online social media platform, it would be helpful to build up a network of gatekeepers or spectators who are able to contribute to early identification of people at risk from the population at large.

Most influential reposters could serve as suicide prevention gatekeepers: They are more likely to show caring attitudes toward the attempter. Given the assumption that the selected incident is not an isolated case, and the reactions of the reposters are indeed common, suicide-prevention professionals may consider developing awareness campaigns and gatekeeper training programs that target active and popular online users.

Meanwhile, we acknowledge that it is still premature to conclude that engaging with online social networks eventually reduces an individuals' suicide risk (or at a minimum does no harm). In this specific case, 20% of the messages expressed a cynical or indifferent attitude toward the suicidal person's self-presentation, with some considered cyberbullying. Disconfirmation may have undesirable effects on the emotions of the attempter and other suicidal individuals who are exposed to these messages. This phenomenon may be more pronounced if the post belongs to a celebrity, much like the prominent impact of media reports of celebrity suicide (Fu & Yip, 2009). In addition, we do not know whether the suicidal person received any proper help or support from professionals and/or his offline social network after being found by the police, given that mental health services are generally not very accessible in China (Cheng et al., 2012). From the written responses, we could not find any microbloggers exhibiting suicidal risks when receiving and/or forwarding J's message, but we remain uncertain whether readers' mental well-being would be



impacted over a longer period of time. Online self-presentation may have other side effects not examined in the current study.

The Chinese government recently imposed a legal requirement of using one's real name when registering to use social media (Bradsher, 2012). Early evidence suggests this has had a chilling effect on political comments in China (Fu, Chan, & Chau, 2013). Such a requirement may also discourage vulnerable individuals' expressions of feelings or calls for help. The impact on the behavior of microbloggers is yet to be recognized, with more studies needed in order to understand the requirement's effect on the microblog usage in China.

## Conclusion

Diffusion of suicide-related content across social media is a recent and rapidly growing phenomenon. There are not enough empirical data to suggest whether the benefits or harms brought by social media on suicidality outweigh one another. This study, however, suggests a suicidal attempt can be disrupted in time if social media is harnessed in positive ways. Researchers should closely monitor the effects of new media on individuals' mental health and suicidal acts. Clinicians who help suicidal individuals should explore their clients' use of social media and suggest ways to make social media one of the safety nets available to them when necessary. Moreover, an appropriate referral system needs to be established to provide follow-up support and services to individuals who self-present suicidal thoughts and/or behaviors online. Suicide researchers should closely monitor the potential effect of the new media on individual's mental well-being and suicidality. Understanding how and why new information technologies are adopted marks important research areas. Public health and media professionals may consider developing guidelines to respond to this exploding phenomenon. Social media can be known as a double-edged sword: On the one hand, it is a platform for spreading suicidal thoughts or mimicking suicidal acts, whereas on the other hand it also plays a constructive role in early detection of people at suicidal risk. Further empirical research is needed to reveal how the suicidal population interacts with the social media and what we can do to intervene effectively.

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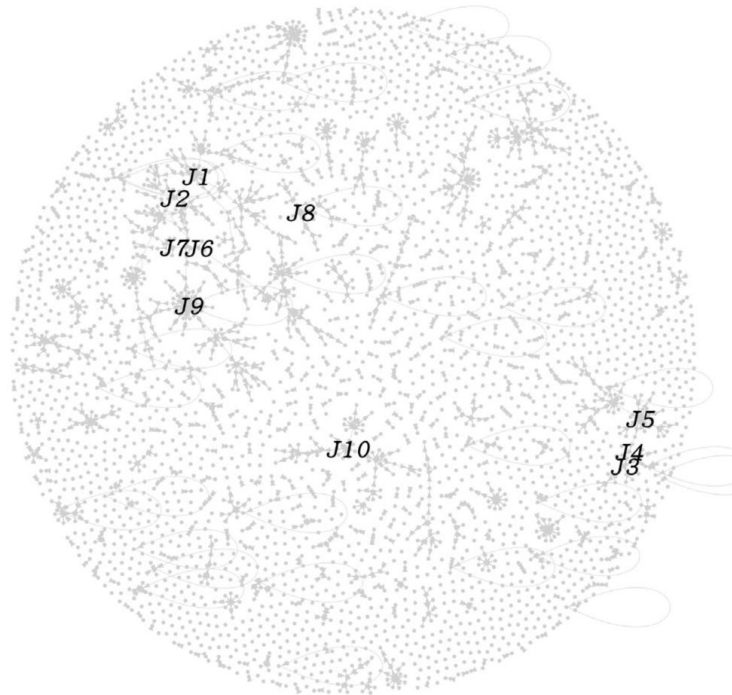
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## References

- Biddle L, Donovan J, Hawton K, Kapur N, Gunnell D. Suicide and the internet. *BMJ*. 2008; 336:800–802. [PubMed: 18403541]
- Bradsher, K. China toughens its restrictions on use of the internet. *The New York Times*. Dec 28. 2012 Retrieved from <http://www.nytimes.com/2012/12/29/world/asia/china-toughens-restrictions-on-internet-use.html>
- Chau M, Xu J. Mining communities and their relationships in blogs: A study of online hate groups. *International Journal of Human-Computer Studies*. 2007; 65:57–70.
- Cheng Q, Chang S-S, Yip PSF. Opportunities and challenges of online data collection for suicide prevention. *The Lancet*. 2012; 379:e53–e54.
- Cheng Q, Fu KW, Yip PSF. A comparative study of online suicide-related information in Chinese and English. *Journal of Clinical Psychiatry*. 2011; 72:313–319. [PubMed: 20868633]
- China Internet Network Information Center (CNNIC). 30th statistical report on internet development in China. Author; Beijing, China: 2012.
- Csardi, G.; Nepusz, T. The igraph software package for complex network research. *InterJournal, Complex Systems*, 1695. 2006. Retrieved from [http://www.interjournal.org/manuscript\\_abstract.php?361100992](http://www.interjournal.org/manuscript_abstract.php?361100992)
- Farberow, NL.; Shneidman, ES. *The cry for help*. McGraw-Hill; New York, NY: 1961.
- Freeman LC. Centrality in social networks: Conceptual clarification. *Social Networks*. 1978; 1:215–239.
- Fu KW, Chan CH, Chau M. Assessing censorship on microblogs in China: Discriminatory keyword analysis and impact evaluation of the “Real Name Registration” policy. *IEEE Internet Computing*. 2013; 17(3):42–50.
- Fu KW, Chan WSC, Wong PWC, Yip PSF. Internet addiction: Prevalence, discriminant validity and correlates among adolescents in Hong Kong. *British Journal of Psychiatry*. 2010; 196:486–492. [PubMed: 20513862]
- Fu, KW.; Wong, PWC.; Yip, PSF. Internet and emerging suicide method: A case study of contagion of charcoal burning suicides via the Internet. In: Sher, L.; Vilens, A., editors. *Internet and suicide*. Nova Science; New York, NY: 2009. p. 153-168.
- Fu KW, Yip PSF. Estimating the risk for suicide following the suicide deaths of three Asian entertainment celebrities: A meta-analysis approach. *Journal of Clinical Psychiatry*. 2009; 70:869–878. [PubMed: 19573483]
- Gillmor, D. *We the media: Grassroots journalism by the people, for the people*. O'Reilly Media; Sebastopol, CA: 2004.
- Granovetter MS. The strength of weak ties. *American Journal of Sociology*. 1973; 78:1360–1380.



- China microblog industry and user research report 2010 [in Chinese]. 2011. Retrieved from <http://www.iresearch.com.cn>
- Joiner TE. The clustering and contagion of suicide. *Current Directions in Psychological Science*. 1999; 8:89–92.
- Kaplan AM, Haenlein M. Users of the world, unite! The challenges and opportunities of social media. *Business Horizons*. 2010; 53:59–68.
- Landis JR, Koch GG. Measurement of observer agreement for categorical data. *Biometrics*. 1977; 33:159–174. [PubMed: 843571]
- Lewis, TG. *Network science: Theory and practice*. Wiley; Hoboken, NJ: 2009.
- Luxton DD, June JD, Fairall JM. Social media and suicide: A public health perspective. *American Journal of Public Health*. 2012; 102(S2):S195–S200. [PubMed: 22401525]
- Mozur, P. How many people really use sina weibo?. *Wall Street Journal China*. Mar 12. 2013  
Retrieved from <http://blogs.wsj.com/chinarealtime/2013/03/12/how-many-people-really-use-sina-weibo>
- National Bureau of Statistics of China. Gross national income and gross domestic product. 2012.  
Retrieved from <http://219.235.129.58/reportYearBrowse.do>
- Niederkröthaler T, Fu KW, Yip PSF, Fong DYT, Stack S, Cheng Q, Pirkis J. Changes in suicide rates following media reports on celebrity suicide: A meta-analysis. *Journal of Epidemiology and Community Health*. 2012; 66:1037–1042. [PubMed: 22523342]
- Oreilly T. *What is web 2.0: Design patterns and business models for the next generation of software*. Communications and Strategies. 2007; 1:17.
- R Development Core Team. *R: A language and environment for statistical computing*. R Foundation for Statistical Computing; Vienna, Austria: 2010. Retrieved from <http://www.R-project.org/>
- Rajagopal S. Suicide pacts and the internet. *BMJ*. 2004; 329:1298–1299. [PubMed: 15576715]
- Recupero PR, Harms SE, Noble JM. Googling suicide: Surfing for suicide information on the internet. *Journal of Clinical Psychiatry*. 2008; 69:878–888. [PubMed: 18494533]
- Richburg, KB. In China, microblogging sites become free-speech platform. *The Washington Post*. Mar 28. 2011 Retrieved from [http://articles.washingtonpost.com/2011-03-27/world/35260490\\_1\\_weibo-free-speech-posts](http://articles.washingtonpost.com/2011-03-27/world/35260490_1_weibo-free-speech-posts)
- Ruder TD, Hatch GM, Ampanozi G, Thali MJ, Fischer N. Suicide announcement on facebook. *Crisis*. 2011; 32:280–282. [PubMed: 21940257]
- Silenzio VM, Duberstein PR, Tang W, Lu N, Tu X, Homan CM. Connecting the invisible dots: Reaching lesbian, gay, and bisexual adolescents and young adults at risk for suicide through online social networks. *Social Science and Medicine*. 2009; 69:469–474. [PubMed: 19540641]
- Vygotsky, LS. *Mind in society: The development of higher psychological process*. Harvard University Press; Cambridge, MA: 1978.
- Walther JB. Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research*. 1996; 23:3–43.
- Walther, JB. Theories of computer-mediated communication and interpersonal relations. In: Knapp, ML.; Daly, JA., editors. *The SAGE handbook of interpersonal communication*. Sage; Los Angeles, CA: 2011. p. 443-480.
- Wickre, K. Celebrating #Twitter7. Mar 21. 2013 Retrieved from <https://blog.twitter.com/2013/celebrating-twitter7>
- Wong PW, Fu KW, Yau RS, Ma HH, Law YW, Chang SS, Yip PS. Accessing suicide-related information on the internet: A retrospective observational study of search behavior. *Journal of Medical Internet Research*. 2013; 15:e3. [PubMed: 23305632]
- Zhao J, Wu J, Xu K. Weak ties: Subtle role of information diffusion in online social networks. *Physical Review E*. 2010; 82:016105.



**Figure 1.** Graphical visualization of the repost network. *Note.* Each node represents a microblogger, and an arrow represents a message reposted from one microblogger to the other. The nodes with name labels are the top ten most influential reposters.

**Table 1**Classification of microbloggers' responses to the original message ( $N = 5,971$ )

Type of response	%	Translated examples
Caring, showing empathy, and giving advice	19.8	<p>"Are you alright? Hope you are fine."</p> <p>"Brother, I wish you are ok."</p> <p>"Don't ... Life is so important. If you give up your life, you lose your love too."</p>
Calling for help	16.8	<p>"Damn it. Call the police now. He is in Shenzhen."</p> <p>"110, 120, SOS ... Help this guy."</p> <p>"My God. Who knows his address? Call emergency now."</p>
Cynical or indifferent comments	23.4	<p>"Why make your hand full of chocolate?"</p> <p>"Save your blood. Many hospitals need that."</p> <p>"[Angry] I hate these self-harmers."</p>
Shocked	19.5	<p>"OMG. So scary!!"</p> <p>"What's up? You scare me!!"</p> <p>"Ah! Live Weibo broadcast of suicide at midnight?"</p>
Forward to others with no comment	20.4	Reposting Weibo post

**Table 2**

Comparisons between the repost graph and the randomly generated graphs

	<b>Repost graph</b>	<b>Random graphs</b>
Number of nodes	3,696	3,696
Number of edges	1,813	1,813
Density	$1.33 \times 10^{-4}$	$1.33 \times 10^{-4}$
Average degree	0.981	0.981
Average path length	1.93	1.96
Global cluster coefficient	$4.92 \times 10^{-3}$	$2.9 \times 10^{-4}$

*Note.* Random graph indicators were obtained by calculating mean values from 30 randomly generated graphs.

**Table 3**

## Characteristics of reposters

Characteristics	Categories	Reposters sample (N = 3,696) Frequency (%)	Random samples (N = 1,000) Frequency (%)
Sex	Male	54.4	55.0
	Female	42.8	44.9
	Not mentioned	2.8	0.1
Location	Guangdong	26.7	15.1
	Peking	16.4	4.3
	Shanghai	9.7	3.7
	Zhejiang	3.3	4.2
	Jiangsu	3.6	5.8
	International	3.3	1.1
	Others	3.4	7.3
	Sichuan	3.3	4.4
	Fujian	2.3	4.5
	Hubei	1.2	2.8
	Other provinces	26.8	46.8
No. of followers	0–999	90.3	100.0
	1,000–1,999	5.0	0
	2,000–2,999	1.7	0
	3,000–3,999	0.6	0
	4,000–4,999	0.4	0
	5,000	2.0	0
No. of friends	0–199	52.7	99.0
	200–399	24.6	0.8
	400–599	8.7	0.2
	600–799	4.5	0
	800–999	2.8	0

**Table 4**

Characteristics of the 10 most influential microbloggers who reposted the original message

Name of blogger	Sex	Type <sup>*</sup>	Time reposted	No. followers	Out degree <sup>**</sup>	In degree <sup>**</sup>	Betweenness <sup>**</sup>
Blogger J1	F	2	22:17:54	4,075	11	3	108
Blogger J2	F	2	22:17:56	12,795	7	1	80
Blogger J3	F	4	22:17:51	655	4	1	64
Blogger J4	F	4	22:17:38	462	2	1	57
Blogger J5	F	5	22:17:26	268	19	1	52
Blogger J6	F	4	22:17:51	801	4	1	51
Blogger J7	M	1	22:17:50	2,067	4	1	48
Blogger J8	F	5	22:17:50	829	5	1	44
Blogger J9	M	2	22:18:13	6,447	37	3	44
Blogger J10	F	4	22:17:45	691	10	1	43

\* Note. Type of response: (1) "Caring, showing empathy, and giving advice"; (2) "Calling for help"; (3) "Cynical or indifferent comments"; (4) "Shocked"; and (5) "Only reposting with no comment."

\*\* Out-degree centrality of a microblogger M means the number of other microbloggers who repost M's message. In-degree centrality of M represents the frequency that M reposts the message received from others. Betweenness centrality of M represents the total count of pairs of nodes whose shortest path between them consists of M, denoting the relative importance of the position where M is located in the network.