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Permalink

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Journal

Journal of Health Communication, 22(1)

ISSN

1081-0730

Authors

Pan, Wenjing
Shen, Cuihua
Feng, Bo

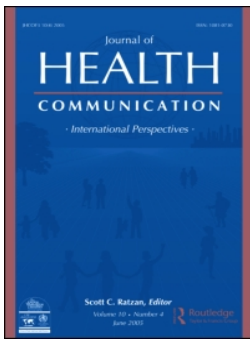
Publication Date

2017-01-02

DOI

10.1080/10810730.2016.1250845

Peer reviewed



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To cite this article: Wenjing Pan, Cuihua Shen & Bo Feng (2017) You Get What You Give: Understanding Reply Reciprocity and Social Capital in Online Health Support Forums, Journal of Health Communication, 22:1, 45-52, DOI: [10.1080/10810730.2016.1250845](https://doi.org/10.1080/10810730.2016.1250845)

To link to this article: <http://dx.doi.org/10.1080/10810730.2016.1250845>



Published online: 27 Dec 2016.



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You Get What You Give: Understanding Reply Reciprocity and Social Capital in Online Health Support Forums

WENJING PAN, CUIHUA SHEN, and BO FENG

Department of Communication, University of California, Davis, Davis, California, USA

Adopting a social network analysis approach, the present study examined social capital and network dynamics of online support seeking and support provision in a depression forum. We constructed a depression forum network by mapping out all of the users and the reply ties among them. The findings showed a consistently reciprocal pattern between users' replies sent to others and replies received from others. Forum users' bridging social capital was positively associated with the source diversity of their received replies and negatively associated with the average length of their received replies. Furthermore, forum users' bonding social capital was positively associated with the average length of their received replies and negatively associated with the source diversity of their received replies.

The Internet has become a major source of health-related information and social support, as 16% of Internet users have gone online to find others who have experienced similar symptoms or share similar health concerns, and 8% report having either posted health-related questions or shared their own experience (Fox & Duggan, 2013). As an alternative or preliminary to obtaining professional diagnosis and treatment, seeking support online minimizes the embarrassment of disclosing stigmatized illnesses to others and provides a more extensive and diverse network of potential support providers who have relevant experiences and expertise (Wright, 2016). Substantial research indicates that online support has a positive impact on individuals' coping with stressful situations and their physical and psychological well-being (Green-Hamann, Campbell Eichhorn, & Sherblom, 2011).

Previous research provides valuable insights into individuals' motivation to use online support forums (e.g., Chen & Choi, 2011; Chung, 2014), the support messages exchanged in those forums (e.g., Amsbary & Powell, 2012; Rains, Peterson, & Wright, 2015), and the health benefits associated with forum participation (e.g., Batenburg & Das, 2015; Houston, Cooper, & Ford, 2002). However, few studies have investigated the interactive and reciprocal nature of support exchange in online support forums (e.g., Cobb, Graham, & Abrams, 2010; Manago, Taylor, & Greenfield, 2012). Drawing on the theoretical framework of social capital and adopting social network analysis, the current study examines the reciprocal nature of communication in online support forums. Specifically, we achieve this objective by (a) using online forum users' support provision network to predict their support reception network and (b) examining the association between forum users' bridging/bonding social

capital and their received support (in terms of the length and source diversity of their received replies).

Online Support Forums as Networks

With the increasing presence of features of social networking sites such as following and friending in online support forums, scholars have shifted attention to the networking aspects of social support online (e.g., Cobb, Jacobs, Saul, Wileyto, & Graham, 2014; Zhu, Woo, Porter, & Brzezinski, 2013). Guided by the sociological approach to studying social support (Burlinson & MacGeorge, 2002), these studies have viewed social support as generated from social networks and social integration. Using both qualitative content analysis and social network analysis, Takahashi and colleagues (2009), for example, found that social networking site users' network centrality was associated with the extent of their interpersonal association (whether people with similar attributes are connected or not).

Active participation in an online support forum generally takes one or both of the following two forms: (a) contributing an original post that initiates a topic discussion and (b) responding to others' posts. Original posts typically reflect support-seeking efforts (Chung, 2014; Feng, Li, & Li, 2016). For example, a self-initiated post often includes a description of the problem for which support is being sought. Replies to an original post from other online users can indicate attention, engagement, and responsiveness to the post (Himmelboim, 2008; Huffaker, 2010; Zhang & Yang, 2015). Seen in this light, social networks based on reply relationships offer a fruitful venue for studying the interactive and reciprocal nature of communication in online support forums.

Social networks can be defined as individuals, also known as *actors* or *nodes*, who are connected by their relations, also known as *ties* or *links* (Hanneman & Riddle, 2005). Therefore, an online support forum can be conceptualized as a network of users connected by their reply-based relationships (Himmelboim, 2008). A tie

from User A to User B indicates that A replied to B's original post. In an online support forum, in-replies refer to replies a user receives from other users, whereas out-replies refer to the replies a user sends out to others. For example, if A replies to B three times and C replies to B two times, this gives B an in-reply of five. In this case, A has an out-reply of three and C has an out-reply of two (see Figure 1).

Another important characteristic of online support forums is the large number of unique communication partners one might encounter. In network terms, in-degree is the number of unique users from whom one has received replies, whereas out-degree is the number of unique users to whom one has replied. In the previous example, because only two persons—A and C—have replied to B, B has an in-degree of two, whereas A and C both have an out-degree of one (see Figure 1).

Replies and Social Capital

The theory of social capital can be used as a productive framework for understanding how reply networks in online support forums create social support. *Social capital* is defined as

the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships in a group—which provides each of its members with the backing of the collectively owned capital, a “credential” which entitles them to credits, in the various senses of the word. (Bourdieu, 1986, p. 247)

Through participation in social networks, individuals gain access to new information and draw on resources from other members of the network (Ellison, Steinfield, & Lampe, 2007). These resources usually take the form of personal relationships or informational and emotional resources that are helpful in responding to life stresses (Green-Hamann & Sherblom, 2014).

An online support forum provides social capital in that it is an embedded community activated for purposeful action (Drentea & Moren-Cross, 2005). Social capital can take the form of social support in that it provides companionship, emotional and material aid, goods and services, information, and a sense of belonging (Wellman & Frank, 2001). Social support is not only a substantiation but also an outcome of social capital because the latter provides individuals with resources or connections to receive social support from network members when needed (Resnick, 2001). The time, limited attention, and resources

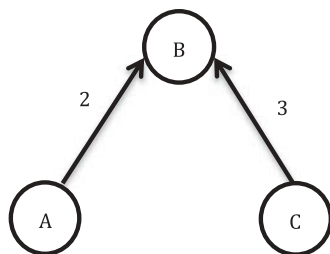


Fig. 1. An example of a three-actor network. Actor B has an in-reply of five (two replies from A and three replies from C) and an in-degree of two (A and C).

users invest when reading and replying to others' messages can be viewed as invested social capital. In return, it is expected that these users will be awarded others' replies as rewards for their investment of social capital.

Social Capital and Reciprocity

Social capital can be seen as productive resources generated from previous interactions that are inherent to social relations (Resnick, 2001). These productive resources may include obligations, roles, and norms of behavior for people playing different roles. The norm of reciprocity is especially useful for social support exchange because it creates the expectation that anyone who receives a favor should reciprocate to the original sources or to someone else (Resnick, 2001). In a social group, members are more likely to help those who have provided them benefits before (e.g., Deckop, Cirka, & Andersson, 2003).

In online support forums, when users write replies, they contribute time, energy, and other resources to create a sustainable social structure (Butler, 2001). Meanwhile, not every user has the same chance to receive the information and help he or she seeks in support forums. Research has shown that individuals' participation in online communities promotes reciprocal engagement from other members of the community (Kobayashi, Ikeda, & Miyata, 2006). Huffaker (2010), for example, found that in online discussion groups, users' number of received replies was positively associated with their frequency of posts.

Similarly, we propose that there will be a positive association between the frequency and length of replies one provides and the frequency and length of replies one receives. The frequency and the length of replies both reflect users' degree of participation in forum discussion. Reply frequency has been used by previous studies to measure online support group members' degree of participation (Batenburg & Das, 2015). The length of writing has been adopted as an objective parameter for message quantity because it reflects the writer's "self-disclosure through sharing personal information, thoughts, and feeling with others" (Barak & Gluck-Ofri, 2007, p. 409). Message length was used in past research as a "proxy for amount of communication" (Tausczik & Pennebaker, 2010, p. 33). It has also been adopted by several studies as a measure of intensity of involvement (e.g., Leshed, Hancock, Cosley, McLeod, & Gay, 2007; Pan, Feng, & Wingate, 2016). Based on the preceding review and rationale, we propose the following hypotheses:

- Hypothesis 1: Forum users' number of in-replies will be positively correlated with their number of out-replies.
- Hypothesis 2: Forum users' in-degree will be positively correlated with their out-degree.
- Hypothesis 3: Forum users' average length of in-replies will be positively correlated with their average length of out-replies.

Bridging Social Capital

Social capital can be categorized into two types: bridging and bonding social capital (Putnam, 2001; Williams, 2006). These two types of social capital can be understood structurally from the perspective of structural hole theory proposed by Burt (1992). Structural holes

are essentially the absence of ties in a network (Burt, 1992). In an individual's (ego's) network, structural holes exist when ego's contacts are indirectly connected through ego but do not have direct ties themselves. As a result, ego, who brokers otherwise unconnected contacts, is exposed to nonredundant information and resources from these contacts by the lack of connection therein.

One's possession of bridging social capital can be measured by network betweenness, which is an index indicating the extent to which a person brokers indirect connections with others in a network (Burt, 2001). That is, individuals who possess bridging social capital serve as brokers or bridges that connect otherwise unconnected members. Although such a structure creates an abundance of novel information and opportunities, it also tends to rely on "broad but somewhat shallow relationships" (Shen & Cage, 2013, p. 397) and, as a result, is less likely to offer much emotional and substantive support.

In online support forums, in which replies can be seen as a limited resource and an index of attention, individuals who send out replies to many unconnected others generate more bridging capital. By establishing loose but diverse ties with other forum users, users actively cultivate and maintain larger networks of relationships from which they can receive diverse and diffuse information. When forum users with more bridging social capital seek help, they are thus more likely to receive support from many different users. Support seekers who receive replies from many different users are considered to have high in-reply source diversity compared to users who only receive replies from a limited number of others.

Accordingly, we propose the following hypothesis:

Hypothesis 4: Forum users' bridging social capital will be positively associated with the source diversity of their in-replies.

In addition, we predict that individuals who send out replies to a more diverse audience are likely to receive shorter or leaner replies than those who have fewer but more intensive interactions with others. Because bridging social capital mainly helps users maintain large and diverse networks of relationships, the support or resources brought by taking the brokerage position is somewhat shallow or less substantial compared to the ties formed within a well-connected group. When users who possess more bridging social capital post on an online support forum, they are thus likely to receive shorter replies from others because of the weak nature of these ties. Therefore, we propose the following hypothesis:

Hypothesis 5: Forum users' bridging social capital will be negatively associated with the average length of their in-replies.

Bonding Social Capital

Bonding social capital occurs when closely tied individuals, such as family and close friends, provide emotional or substantive support for one another (Williams, 2006). In contrast to bridging capital's inclusiveness and diverseness (Putnam, 2001), bonding capital is exclusive because it is formed based on the network structure of closure. Network closure (a) affects access to information because

the information is mostly shared among network members and (b) facilitates the building of trust among network members (Burt, 2001). Individuals who have a highly interconnected network usually possess greater bonding social capital because network members have frequent interactions within the network. Network closure has been structurally measured by constraint, which indicates the interconnectivity among ego's contacts (Ganley & Lampe, 2009). Through repeated and frequent interactions within the network, members develop strong emotional bonds and offer and receive support to and from one another, especially during crisis or stressful situations (Ellison et al., 2007; Williams, 2006). Bonding social capital provides individuals with substantive support but offers relatively little diversity (Shen & Cage, 2013; Williams, 2006).

In online support forums, the ties formed between each dyad of users are not the same. Within a closely knit or closed network in which everyone knows everyone else, users can form close relationships and cultivate trust among themselves. Therefore, when needed, these users will spend more resources (e.g., in the form of time or energy) when providing help. In online support forums, in which replies can be viewed as a form of attention and care, longer replies would contain more resources and information and take users more time to construct. Therefore, the average length of replies can serve as an index of the effort and time other users have devoted to replying. When forum users invest their limited attention and resources in providing longer replies to others, it becomes less likely (or more difficult) for them to maintain a large and diverse relationship network. Based on this rationale, we propose the following hypotheses:

Hypothesis 6: Forum users' bonding social capital will be positively associated with the average length of their in-replies.

Hypothesis 7: Forum users' bonding social capital will be negatively associated with the source diversity of their in-replies.

Methods

Data Collection

An online health support community called Depression Forums was chosen for the current study.¹ In July 2014, all of the information that the users provided on the forum (e.g., user name, user identifier, post and reply time, post content and reply content) was extracted using a customized Web crawler (script written in Python), yielding a total sample of 34,554 users who had contributed 63,514 posts and 592,649 replies from July 2004 to July 2014.

During the period of data collection, 17,572 users never made any posts or replies, and more than 90% of the registered users had fewer than 10 sent and received replies combined. In order to focus our analysis on active forum users' interactions, we extracted a subsample of users whose combined in-reply and out-reply messages was at least 10 over the 10 years. The

¹Depression Forums (www.depressionforums.org) was founded in July 2004 as an online discussion forum in which individuals can talk to others about depression, anxiety, mood disorders, medications, and recovery.

subsample contained 2,061 users and 62,274 replies and was used in the final analyses.²

Data Analysis

Based on users' reply pattern, two adjacency matrices were created. The first one was a dichotomized network, with rows and columns representing actors and ones and zeros in the cells representing the presence and absence of a reply-based tie between two users (Hanneman & Riddle, 2005). The second one was a weighted network with numbers in the cells representing the reply number between two users. These two matrices were analyzed using R packages *sna* (Butts, 2014) and *network* (Butts, Hunter, Handcock, Bender-deMoll, & Horner, 2015), calculating network statistics including in-replies, out-replies, in-degree, out-degree, and social capital measures (see below) to be used in hypothesis testing. SPSS Version 20 then was used to test the hypotheses.

Measures

In-Replies and Out-Replies

In-replies were calculated as the number of replies one received from others (adding all of the numbers in each row of the weighted adjacency matrix). Out-replies were calculated as the number of replies one sent out to others (adding all of the numbers in each column of the weighted adjacency matrix).

In-Degree and Out-Degree

In-degree and out-degree were calculated as the unweighted number of unique users one replied to or received replies from (adding all of the numbers in each row or column of the dichotomized adjacency matrix).

Average Length of In-Replies/Out-Replies

Users' average length of in-replies (out-replies) was calculated by using the aggregated length of all in-replies (out-replies) one received (sent) divided by the number of in-replies (out-replies).

Social Capital

Because bridging and bonding social capital can be associated with distinct network structures (brokerage and closure), using structural measures of social capital (Burt, 2012; Shen, Monge, & Williams, 2014) can avoid social desirability bias that accompanies self-reported assessment (e.g., Ellison et al., 2007; Williams, 2006).

Bridging Social Capital. Following similar studies of online social capital (e.g., Ganley & Lampe, 2009), we measured bridging social capital structurally as network betweenness. Betweenness measures the extent to which an actor falls on the geodesic (shortest) paths between other pairs of actors in the network (Hanneman & Riddle, 2005). Betweenness measures the percentage of an actor's neighbors that are not

directly connected to one another.³ For example, suppose that $g_i^{(st)}$ is the number of geodesic paths from actor s to actor t that pass through i and that n_{st} is the total number of geodesic paths from s to t . The betweenness of actor i can be given in the following formula (Newman, 2005):

$$b_i = \frac{\sum_{s < t} g_i^{(st)} / n_{st}}{\frac{1}{2}n(n-1)}. \quad (1)$$

Bonding Social Capital. We measured bonding social capital structurally as network constraint. Constraint measures "the interconnectivity, or relationship redundancy, of the sub-network immediately surrounding a node" (Ganley & Lampe, 2009, p. 270). Constraint evaluates the extent to which ego's time and energy is solely invested in a single group of interconnected contacts. A large number for constraint suggests that ego invests most resources within a small and connected group of nodes. Constraint is calculated by the following formula (Burt, 1992):

$$C_{ij} = (p_{ij} + \sum_q p_{iq}p_{qj})^2, q \neq i, j, \quad (2)$$

where p_{ij} is the proportion of ego i 's resource invested in the connection with j and p_{qj} is the strength of q 's tie to j ,

In-Reply Source Diversity

In his theory of heterogeneity, Blau (1977) developed an index to measure cultural diversity and in-groups/out-groups social comparison in firms. Blau's index of heterogeneity ranges from 0 to 1, where 1 is the greatest heterogeneity and diversity. It has been widely used in network analysis as an index of diversity (DiMaggio & Garip, 2012; McPherson, Smith-Lovin, & Cook, 2001; Scott, 2012). In this study, the source diversity of in-replies refers to the diversity of the sources of in-replies rather than diversity in terms of users' characteristics or types of social support, which was unavailable in our data. It can be expressed with the following formula as a measure of the source diversity of the in-replies users receive:

$$b_a = 1 - \sum_{i=1}^k \left(\frac{\text{inreplies}_i}{\text{sumofinreplies}} \right)^2. \quad (3)$$

In this formula, b is Blau's index for node a in the network, i stands for the i th source from whom a receives replies, and k is the total number of sources of a 's in-replies.⁵

³Betweenness should be differentiated from degree, which simply measures how many unique ties an actor has with others. For example, an actor can have a high degree but very little betweenness if all of the actor's contacts are connected among themselves. In this case, this actor holds little bridging social capital because he or she does not serve as a bridge that links disparate groups together.

⁴In the final analysis, to align the scale of betweenness with other variables, we multiplied the betweenness score by 1,000 (Shen & Cage, 2013).

⁵The source diversity of in-replies should be differentiated from the construct of in-degree. In-degree only measures the number of users one has received replies from in the support forum and does not account for the frequency of interactions. Source diversity of in-replies, however, takes into account both the frequency of interactions and the number of users with whom one has interacted. Therefore, it is a more comprehensive measure to represent the outcome brought out by bridging capital.

²We also conducted the same analysis with people who had sent out or received at least one reply ($N = 16,982$, Network 1). All hypotheses were supported except for Hypothesis 7. One possible explanation for this is that most users of Network 1 were not actively involved in the online support forum activities, as 35% of the users either contributed or received only one reply, and almost 75% received or sent out five or fewer replies.

Table 1. Descriptive statistics

Measure	<i>M</i>	<i>SD</i>	Range
1. In-replies	29.23	44.07	1–896
2. Out-replies	29.23	58.19	0–1187
3. In-degree	11.51	25.75	0–548
4. Out-degree	11.51	33.50	0–826
5. Blau's index (in-replies)	0.85	0.08	0.2–0.99
6. Average length of in-replies	155.81	64.68	25–686
7. Average length of out-replies	153.84	90.28	14–883
8. Betweenness	0.77	7.57	0–0.31
9. Constraint	0.05	0.02	0–0.20

Results

On average, the users in our sample received 29.23 replies ($SD = 44.07$) from 11.51 other users ($SD = 25.75$). Naturally, they also sent out an average of 29.23 replies ($SD = 58.19$) to 11.51 other users ($SD = 33.50$; see Table 1).

We predicted reciprocity between users' in-replies and out-replies (Hypothesis 1), in-degree and out-degree (Hypothesis 2), and average length of in-replies and average length of out-replies (Hypothesis 3). Pearson product correlation analyses showed that the number of users' in-replies was positively correlated with their out-replies, $r(2059) = .49$, $p < .001$. Users' in-degree was positively correlated with their out-degree, $r(2059) = .52$, $p < .001$. Users' average length of in-replies was positively correlated with their average length of out-replies, $r(2059) = .66$, $p < .001$. Therefore, Hypothesis 1, Hypothesis 2, and Hypothesis 3 were all supported.

Hypothesis 4 predicted a positive relationship between bridging social capital (measured by betweenness) and source diversity of in-replies. Regression analyses showed that betweenness ($M = 0.77$, $SD = 7.57$) significantly predicted source diversity of in-replies ($M = .85$, $SD = .08$), $\beta = .08$, $t(2059) = 3.63$, $p < .001$. Bridging social capital explained a significant portion of the variance in the source diversity of in-replies, $R^2 = .006$, $F(1,2059) = 13.20$, $p < .001$. Therefore, Hypothesis 4 was supported.

Hypothesis 5 predicted a negative relationship between bridging social capital and the average length of in-replies. Because the average length of out-replies was also highly correlated with the average length of in-replies (Hypothesis 3), it was included in the regression model as a control. Bridging social capital ($M = 0.77$, $SD = 7.57$) negatively predicted the average length of in-replies ($M = 155.81$, $SD = 64.68$), $\beta = -.05$, $t(2058) = -2.91$, $p < .01$. Bridging social capital explained a significant portion of the variance in the average length of in-replies, $\Delta R^2 = .002$, $F(1, 2058) = 811.03$, $p < .01$. Therefore, Hypothesis 5 was supported.

Hypothesis 6 predicted a positive relationship between bonding social capital (measured by constraint) and the average length of in-replies. When we controlled for the average length of out-replies, bonding social capital ($M = .05$, $SD = .03$) significantly predicted the average length of in-replies ($M = 155.81$, $SD = 64.68$), $\beta = .06$, $t(2058) = 3.51$, $p < .001$. Bonding social capital explained a significant amount of variance in the average length of in-replies, $\Delta R^2 = .003$, $F(1, 2058) = 814.50$, $p < .001$. Therefore, Hypothesis 6 was supported.

Hypothesis 7 predicted a negative relationship between bonding social capital and the source diversity of in-replies. Because bridging social capital was also significantly correlated with the source diversity of in-replies, it was included in the regression analysis as control. Bonding social capital ($M = .05$, $SD = .03$) negatively predicted the source diversity of in-replies ($M = .85$, $SD = .08$), $\beta = -.38$, $t(2058) = -18.69$, $p < .001$. Bonding social capital explained a significant amount of variance in the source diversity of in-replies, $\Delta R^2 = .14$, $F(1, 2058) = 182.38$, $p < .001$. Therefore, Hypothesis 7 was supported.

Discussion

Participation in online support groups provides users with opportunities to learn from others' similar experiences, helps alleviate the stress caused by negative events (Lin & Anol, 2008), and improves users' coping and well-being (Rains & Young, 2009). In this study, we examined participation in an online depression forum through the lens of social capital. Depression is a prevalent form of mental illness that is of major clinical and public health importance. It is estimated that, globally, more than 350 million people of all ages suffer from depression (World Health Organization, 2016). For individuals experiencing depressive symptoms, online support forums can serve as important venues through which they can obtain support from others to cope with their health condition (Takahashi et al., 2009). In light of the increasing cost of health care that people are facing today (Mills, 2016), peer support in the form of mutual sharing of information and experiences is a viable strategy for individuals to cope with health issues such as depression (Dennis, 2003). Internet-based support groups have emerged as a particularly popular platform on which people exchange peer support (Eysenbach, Powell, Englesakis, Rizo, & Stern, 2004). However, obtaining social support on those platforms is not guaranteed, and the distribution of such social support can be highly uneven. Therefore, understanding how social support is generated in online forums has both theoretical and pragmatic significance.

Through a network analysis of a large online depression forum, our study provides important empirical evidence that social support in online health forums is highly reciprocal and self-generative. Specifically, users' number of received replies was highly correlated with the number of replies they sent out. The number of users they received replies from was also correlated with the number of users they replied to. Furthermore, the average length of replies individuals received from fellow forum users was highly correlated with the average length of the replies that they sent out to others.

Our findings also suggest that the depression forum users' bridging and bonding social capital could generate different types of social support. Specifically, the depression forum users who had more bridging social capital and connected otherwise disparate groups received replies from many users, but these replies tended to be relatively short. This finding is consistent with the idea that bridging capital enables users to connect to a large and diverse audience from whom they can draw various forms of resources (Ellison et al., 2007; Resnick, 2001). In online support forums, access to more diverse viewpoints

about health problems enables users to interact with a diverse audience and increases the likelihood of users comparing themselves to others in terms of coping with stressful situations (Wright, 2016). Meanwhile, it should be noted that the association between the two types of social capital and the source diversity and the average length of replies was rather small. Although this finding could be in part due to the large sample size, it also suggests that factors other than social capital exert a stronger influence on the source diversity and length of replies people receive in online support forums.

Our study also revealed that forum users who possessed more bonding social capital and were embedded within tightly connected groups tended to receive replies from a few others, but such replies were on average of greater length. Receiving longer replies from a limited number of others can provide users with a higher likelihood of receiving substantial support from others because longer replies indicate that the message writer put more effort, time, and energy into crafting the message. One practical implication of our findings for users of online health forums is that they should interact with a large number of forum users if they desire to receive more diverse information and perspectives; however, they should probably limit their interaction to a small group of others if they want to receive potentially more detailed information and substantive support.

Methodologically speaking, our study makes two notable contributions. Most previous studies have relied solely on frequency of posting or time spent in online communities as indices of participation. Investigating users' reply networks, we have provided more nuanced metrics of participation by making a distinction between (a) the number of replies one sent out versus the number of replies one received from others and (b) the number of unique communication partners one replied to versus the number of unique communication partners one received replies from. Making these distinctions allowed us to better assess the directionality of interaction among forum users. Another contribution of our study lies in the application of structural measurements of social capital in online forums. Scholars have adopted different definitions and operationalizations of social capital in the past (Burt, 2000; Ganley & Lampe, 2009; Putnam, 2001; Williams, 2006), yet few have explored the nuances within the structure of the reply exchange network. Adopting structural measurements, we calculated the frequency, diversity, bridging social capital (betweenness), and bonding social capital (constraint) of each user within the reply network. This also enabled us to avoid the self-report errors that often accompany surveys or interviews (Ganley & Lampe, 2009; Shen & Cage, 2013).

Limitations and Future Research

This study has several limitations. One limitation is the lack of content measures of the replies exchanged in the forum. Although the number and frequency of interactions can reflect the users' attention, users' interest, and intensity of the interaction, the actual content of the replies is an important indicator of message quality. Without investigating the actual messages exchanged by forum users, our findings are confined to the quantitative aspects of support. Future research should examine

message content measures, such as verbal person-centeredness (Feng et al., 2016), to depict a more comprehensive picture of supportive interactions in online support forums.

Another limitation lies in the lack of causality in the findings. Because the forum data were collected simultaneously and in an unobtrusive way, our data did not allow for direct assessment of causal relations between the network structure measures and the outcome measures. Future research may use time stamps provided in the forum or other controlled experimental conditions to examine the time sequence and possible causal relations in online supportive interactions.

Conclusion

As online support forums become increasingly popular, it is important to understand how users benefit from participating in forum discussions. The present study examined social capital and interaction dynamics of social support (in the form of replies) in a depression forum. The results revealed the highly reciprocal and generative nature of social support. Forum users' bridging and bonding social capital contributed differently to the source diversity and length of replies.

Our findings support several general conclusions and implications. First, the reply patterns suggest that online support forums are built on a foundation of reciprocal exchange. Users of online support forums are thus advised to provide social support to others in order to garner support for themselves. This principle may be especially critical for users of online forums about mental health topics, given that most users of these forums likely share the need for support from others. Second, using the framework of social capital, this study found that people with different types of social capital tend to benefit differently from their participation in terms of the number, source diversity, and length of received replies. Depending on the nature of the desired support, users of online health forums should invest their limited time and resources strategically to establish and maintain different ties with others. From an intervention point of view, our findings are also applicable to the design of online forums for health topics. Certain forum features can be incorporated into the system in order to promote discussion and facilitate the creation of bridging and bonding social capital among forum users. For example, a support forum can make visible the history of interaction between any pair of users so that users can focus their time and resources on those connections best suited for their social support needs.

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