



Psychological antecedents of COVID-19 information sharing within strong-tie and weak-tie networks

Linqi Lu ^a, Jiawei Liu ^b, Y. Connie Yuan ^{b,c}, Enze Lu ^d, Dongxiao Li ^{e,*}

^a School of Journalism and Mass Communication, University of Wisconsin-Madison, Madison, WI, USA

^b Department of Communication, Cornell University, Ithaca, NY, USA

^c Department of Global Development, Cornell University, Ithaca, NY, USA

^d Wenzhou Medical University, Wenzhou, Zhejiang, China

^e College of Media and International Culture, Zhejiang University, Hangzhou, Zhejiang, China

ARTICLE INFO

Keywords:

COVID-19 information sharing
Strong-tie networks
Weak-tie networks
Behavioral beliefs
Negative emotions

ABSTRACT

Objective: This study investigates the psychological mechanisms underlying people's sharing of COVID-19 information within their strong-tie networks and weak-tie networks.

Methods: A cross-sectional online survey was conducted between March and April 2020 ($N = 609$ Chinese adults). Measures included emotions and behavioral beliefs about COVID-19 information sharing, risk perceptions, and COVID-19 information acquisition and sharing behaviors. Multiple linear regression was performed to examine the psychological predictors of COVID-19 information sharing.

Results: People were more likely to share COVID-19 information within their strong-tie networks when they experienced more negative emotions ($\beta = .09, p = .01$) and had stronger beliefs that information sharing would promote disease prevention ($\beta = .12, p = .004$). By comparison, negative emotions were the only significant predictor of COVID-19 information sharing ($\beta = .12, p = .002$) within weak-tie networks ($\beta = .04, p = .31$ for beliefs about sharing).

Conclusion: People may share COVID-19 information within weak-tie networks to cope with negative emotions regardless of whether they perceive information sharing as beneficial to disease prevention.

Innovation: Health educators should raise people's awareness of the psychological motivators of COVID-19 information sharing to create a healthy information environment for disease prevention.

1. Introduction

During the COVID-19 pandemic, health information acquisition and sharing may affect disease prevention and health outcomes [1]. While most research has focused on health information seeking [2,3], little is known about health information sharing even though the two behaviors are closely connected [4]. While sharing accurate information may promote disease prevention, misinformation and negative emotions may also spread, causing harms and confusions [1].

From a reasoned action perspective [5], information sharers may assess the impact of a message and decide to share information when they believe that sharing will have favorable influence (i.e., contributing to COVID-19 prevention). Meanwhile, research has also found that emotions also motivate information sharing and negative emotions have stronger impact than positive ones due to negativity bias (negative emotions may heighten perceived issue prominence) [6,7].

Furthermore, patterns of health communication behaviors within one's strong-tie networks (i.e., family members and close friends) versus weak-tie networks (i.e., casual contacts or strangers) may differ substantially [8,9]. Research indicated that when discussing problems within weak-tie networks, people felt that they were judged less harshly and were less obligated to offer help in return [10]. It suggests that people communicated differently in different social networks, depending on psychological needs [9].

Therefore, this study investigates the psychological antecedents of COVID-19 information sharing. We examine behavioral beliefs and emotions as predictors of COVID-19 information sharing within strong-tie and weak-tie networks, respectively. As information sharing may also depend on the volume of information people have acquired and how concerned they are with the disease [2,3], we also assess COVID-19 information acquisition and risk perceptions as covariates. Findings will guide health promotion practices to build a healthy information environment for COVID-19 prevention.

* Corresponding author at: College of Media and International Culture, Zhejiang University, Hangzhou, Zhejiang, China.
E-mail address: ldongxiao@126.com (D. Li).

2. Methods

2.1. Design

This study adopted a cross-sectional online survey asking Chinese adults about their health information behaviors during the COVID-19 pandemic. The survey used convenience sampling. The questionnaire was programmed via the Chinese survey platform SoJump (<http://www.sojump.com>) and survey links were distributed through WeChat (the most popular social media platform in China). Chinese adults 18 years and older were eligible to participate in the survey in exchange for monetary incentives. Data collection was conducted from March 13th to April 3rd, 2020. As more than half of the reported COVID-19 cases globally were in China until mid-March 2020 [11], COVID-19 was arguably the most salient and frequently discussed health issue among Chinese when the survey was administered.

2.2. Participants

617 Chinese adults finished the survey. 609 questionnaires were analyzed and 8 were excluded due to invalid responses or missing data. The demographics of the sample was shown in Table 1. Compared to the 2017 China Health Information National Trends Survey which used multi-stage stratified random sampling [3], the demographics of the sample was skewed toward younger adults with higher education.

2.3. Measures

Respondents indicated the degree to which they had each of the following emotions on a 5-point scale (1 = not at all and 5 = extremely) when deciding to share COVID-19 information. We created a positive emotion index by averaging responses to optimism, hopefulness, and confidence ($\alpha = .94$, $M = 3.60$, $SD = 0.89$) and a negative emotion index by averaging responses to anger, annoyance, anxiety, fear, and sadness ($\alpha = .87$, $M = 2.95$, $SD = 0.85$). These emotion items were selected based on the primary emotions identified by past research and their relevance to the context of COVID-19 [12].

Beliefs about COVID-19 information sharing were measured by asking the respondents their level of agreement with the following statements: COVID-19 information sharing will (a) increase awareness of the disease;

(b) enhance disease guidelines adherence; (c) raise preventive measures; (d) make people panic; (e) disseminate misinformation; (f) be a waste of efforts/time (1 = strongly disagree and 5 = strongly agree). The first three items were averaged to form the positive belief index ($\alpha = .97$, $M = 3.91$, $SD = 0.88$) and the other items as the negative belief index ($\alpha = .80$, $M = 3.15$, $SD = 0.93$).

Network-specific COVID-19 information sharing was measured by asking the respondents about their frequency of sharing COVID-19 information with (a) core family members or close friends; (b) any family members; (c) colleagues, classmates, or people living in their community; and (d) the public (each on a 5-point scale where 1 = never and 5 = always). These items were derived based on the definitions of strong-tie and weak-tie networks: [8,10] the average of the first two items represented strong-tie networks ($r = .75$, $M = 3.31$, $SD = 1.05$) and the other two items measured sharing in weak-tie networks ($r = .72$, $M = 2.89$, $SD = 1.14$). Similarly, information acquisition was measured by asking the respondents about their likelihood of reading COVID-19 messages from the same sources above (1 = not at all likely and 7 = always), $r = .80$, $M = 5.11$, $SD = 1.53$ for strong-tie networks and $r = .70$, $M = 4.58$, $SD = 1.50$ for weak-tie networks.

Information about demographics and COVID-19 risk perceptions was also collected.

2.4. Analysis

We performed multivariate linear regressions with demographics, risk perceptions, emotions, beliefs about sharing, and information acquisition as independent variables and COVID-19 information sharing within strong-tie and weak-tie networks as dependent variables (Table 2).

3. Results

Paired-sample t-test showed that respondents engaged in COVID-19 information sharing more frequently within their strong-tie networks than weak-tie networks, $t(608) = 12.94$, $p < .001$.

For strong-tie networks, having more positive emotions was associated with less frequent COVID-19 information sharing ($\beta = -.10$, $p = .008$) while having more negative emotions was related to more frequent sharing ($\beta = .09$, $p = .01$). Positive beliefs that sharing will contribute to disease prevention was a positive predictor of the sharing behavior ($\beta = .12$, $p = .004$). Also, COVID-19 information acquisition from strong-tie networks and weak-tie networks were both positively associated with sharing within strong-tie networks ($\beta = .29$, $p < .001$ and $\beta = .19$, $p < .001$, respectively).

By comparison, for weak-tie networks, only negative emotions were associated with sharing ($\beta = .12$, $p = .002$) whereas positive beliefs about sharing were a non-significant predictor ($\beta = .04$, $p = .31$). Moreover, only COVID-19 information acquisition from weak-tie networks had a positive relationship with sharing within weak-tie networks ($\beta = .47$, $p < .001$) while no significant association was observed for information acquisition from strong-tie networks ($\beta = -.01$, $p = .90$).

4. Discussion and conclusion

4.1. Discussion

Study findings contributed to our understanding of health information sharing, specifically how beliefs and emotions influence information sharing in different network circles. Overall, we found that people were more likely to share COVID-19 information within their strong-tie networks than weak-tie networks. COVID-19 information acquisition from strong-tie networks was only predictive of information sharing within strong-tie networks whereas information acquisition from weak-tie networks was associated with sharing within both strong-tie and weak-tie networks. These findings suggest that people tend to share information from casual contacts and strangers with their family members and close friends but not vice versa. Previous research showed that heterogeneity in weak-tie networks produces diverse viewpoints [10]. People may disseminate such

Table 1
Demographics of respondents.

Demographics	Number (%) of respondents (N = 609)
Gender	
Male	280 (46.0%)
Female	329 (54.0%)
Age	
18–30	328 (53.9%)
31–50	217 (35.6%)
Above 50	64 (10.5%)
Education	
No college	125 (20.6%)
3-year college	90 (14.8%)
4-year college	270 (44.3%)
Postgraduate	124 (20.4%)
Income	
Below ¥50,000	97 (15.9%)
¥50,000 to ¥100,000	127 (20.9%)
¥100,000 to ¥150,000	127 (20.9%)
¥150,000 to ¥200,000	89 (14.6%)
Above ¥200,000	169 (27.8%)
Married	
Yes	312 (51.2%)
No	297 (48.8%)
Insurance	
No	120 (19.7%)
Yes	489 (80.3%)

Table 2
Multiple linear regression models predicting COVID-19 information sharing.

Predictors	Sharing within strong-tie networks β (B) [SE]	Sharing within weak-tie networks β (B) [SE]
Gender		
Male	Reference	Reference
Female	.01 (0.02) [0.07]	-.03 (-0.08) [0.08]
Age		
18–30	Reference	Reference
31–50	-.05 (-0.11) [0.12]	-.04 (-0.10) [0.13]
Above 50	-.04 (-0.13) [0.16]	-.03 (-0.10) [0.18]
Education		
No college	Reference	Reference
3-year college	.03 (0.08) [0.13]	.06 (0.19) [0.14]
4-year college	.11* (0.23) [0.11]	.09 (0.20) [0.13]
Postgraduate	.17*** (0.45) [0.13]	.13 (0.37) [0.14]*
Income		
Below ¥50,000	Reference	Reference
¥50,000 to ¥100,000	-.05 (-0.12) [0.12]	-.04 (-0.12) [0.13]
¥100,000 to ¥150,000	-.04 (-0.11) [0.12]	-.06 (-0.18) [0.13]
¥150,000 to ¥200,000	.00 (0.00) [0.13]	-.06 (-0.19) [0.14]
Above ¥200,000	-.08 (-0.20) [0.12]	-.13** (-0.34) [0.13]
Married		
Yes	Reference	Reference
No	.06 (0.13) [0.11]	.04 (0.08) [0.13]
Insurance		
No	Reference	Reference
Yes	.04 (0.11) [0.09]	.02 (0.06) [0.10]
Risk perceptions		
Perceived susceptibility	.06 (0.07) [0.04]	.05 (0.06) [0.04]
Perceived severity	.11** (0.13) [0.05]	.03 (0.04) [0.05]
Emotions		
Positive emotions	-.10** (-0.12) [0.04]	-.05 (-0.07) [0.05]
Negative emotions	.09* (0.11) [0.05]	.12** (0.16) [0.05]
Beliefs about sharing		
Positive beliefs	.12** (0.14) [0.05]	.04 (0.06) [0.06]
Negative beliefs	.01 (0.02) [0.04]	.02 (0.04) [0.02]
COVID-19 information acquisition		
From strong-tie networks	.29*** (0.20) [0.03]	-.01 (-0.004) [0.04]
From weak-tie networks	.19*** (0.14) [0.03]	.47*** (0.35) [0.03]
R ²	.34***	.31***

Note: Cell entries are standard regression coefficients with unstandardized coefficients in parentheses and standard errors for unstandardized coefficients in brackets. * $p < .05$; ** $p < .01$; *** $p < .001$

information to their strong-tie networks to add new perspectives and enrich conversations.

More importantly, while multiple factors were associated with COVID-19 information sharing within strong-tie networks, negative emotions appeared to be the only main psychological driver of sharing within weak-tie networks. The findings that negative emotions motivated information sharing within both networks accentuated the prominence of their role, echoing negativity bias [6,7]. Meanwhile, we also found that positive beliefs about the outcomes of sharing motivated information sharing in strong-tie networks, which coincides with the reasoned action theory [5]. In contrast, the absence of a significant relationship between behavioral beliefs and sharing within weak-tie networks might be explained by research that people feel less likely to be critically judged and pressured to offer assistance within weak-tie networks [10].

This study has limitations. First, the sample overrepresented younger adults with higher education. As people who are older have stronger needs for health information and age was positively associated with health information behaviors in China using probabilistic sampling [3], we may have underestimated the frequency of information sharing with the current sample. Second, we measured the frequency of respondents' network-specific information sharing with a 5-point scale from 1 = never to 5 = always instead of using more objective options such as "daily." Our measurement might be more subjective to respondents' interpretations.

4.2. Innovation

Health information sharing has become common in the digital age and may affect disease prevention. Only negative emotions significantly motivated information sharing within weak-tie networks and information from weak-tie networks circulated more widely. These findings provide new perspectives on health education practice.

5. Conclusion

People may share COVID-19 information within weak-tie networks to cope with negative emotions while overlooking the potential impact of these behaviors on disease prevention. By educating the public on these motivations for health information sharing during the pandemic, health consumers may be more cautious in assessing the quality of health information sources prior to sharing COVID-19 information.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of Competing Interest

None.

Acknowledgements

None.

Appendix A. Main survey items

Beliefs about COVID-19 information sharing

Please indicate your level of agreement with the following statements: COVID-19 information sharing will increase disease awareness.

(1 = strongly disagree, 5 = strongly agree)

COVID-19 information sharing will enhance adherence to disease guidelines.

(1 = strongly disagree, 5 = strongly agree)

COVID-19 information sharing will increase preventive measures.

(1 = strongly disagree, 5 = strongly agree)

COVID-19 information sharing will make people panic.

(1 = strongly disagree, 5 = strongly agree)

COVID-19 information sharing will spread misinformation.

(1 = strongly disagree, 5 = strongly agree)

COVID-19 information sharing will be a waste of time and efforts.

(1 = strongly disagree, 5 = strongly agree)

Emotions when deciding to share COVID-19 information

Please indicate the extent to which you had each of the following emotions when you decide to share COVID-19 related information:

Anger (1 = not at all and 5 = extremely)

Annoyance (1 = not at all and 5 = extremely)

Anxiety (1 = not at all and 5 = extremely)

Fear (1 = not at all and 5 = extremely)

Sadness (1 = not at all and 5 = extremely)

Optimism (1 = not at all and 5 = extremely)

Hopefulness (1 = not at all and 5 = extremely)

Confidence (1 = not at all and 5 = extremely)

COVID-19 risk perceptions

How likely is it that you will get COVID-19?

(1 = not likely at all, 5 = extremely likely)

Compared to other people of your age, how likely is it that you will get COVID-19?

(1 = not likely at all, 5 = extremely likely)

How serious a disease is COVID-19?

(1 = not serious at all, 5 = very serious)

Network specific COVID-19 information acquisition

Please indicate your likelihood of reading COVID-19 related information from each of the following sources:

Core family members or close friends

(1 = not at all likely, 7 = always)

Any family members

(1 = not at all likely, 7 = always)

Colleagues, classmates, or people living in your community

(1 = not at all likely, 7 = always)

The public

(1 = not at all likely, 7 = always)

Network-specific COVID-19 information sharing

How often did you share COVID-19 related information with the following people?

Core family members or close friends

(1 = never, 5 = always)

Any family members

(1 = never, 5 = always)

Colleagues, classmates, or people living in your community

(1 = never, 5 = always)

The public

(1 = never, 5 = always)

References

- [1] World Health Organization. Managing the COVID-19 infodemic: Promoting healthy behaviors and mitigating the harm from misinformation and disinformation. Accessed June 1, 2021. <https://www.who.int/news/item/23-09-2020-managing-the-covid-19-infodemic-promoting-healthy-behaviours-and-mitigating-the-harm-from-misinformation-and-disinformation>.
- [2] Neely S, Eldredge C, Sanders R. Health information seeking behaviors on social media during the COVID-19 pandemic among American social networking sites users: Survey study. *J Med Internet Res*. 2021;23:e29802. <https://doi.org/10.2196/29802>.
- [3] Lu L, Liu J, Yuan YC. Health information-seeking behaviors and source preferences between Chinese and U.S. populations. *J Health Commun*. 2020;25:490–500. <https://doi.org/10.1080/10810730.2020.1806414>.
- [4] Talja S, Hansen P. Information sharing. In: Spink A, Cole C, editors. *New Directions in Human Information Behavior*. Springer; 2006. p. 113–34.
- [5] Fishbein M, Ajzen I. Predicting and changing behavior: The reasoned action approach. Psychology Press; 2011..
- [6] Baumeister RF, Bratslavsky E, Finkenauer C, Vohs KD. Bad is stronger than good. *Rev Gen Psychol*. 2001;5:323–70. <https://doi.org/10.1037/1089-2680.5.4.323>.
- [7] Rozin P, Royzman EB. Negativity bias, negativity dominance, and contagion. *Personal Soc Psychol Rev*. 2001;5:296–320. https://doi.org/10.1207/S15327957PSPR0504_2.
- [8] Granovetter MS. The strength of weak ties. *AJS*. 1973;78:1360–80.
- [9] Cutrona CE, Russell DW. Type of social support and specific stress: Toward a theory of optimal matching. In: Sarason BR, Sarason IG, Pierce GR, editors. *Social Support: An Interactional View*. John Wiley & Sons; 1990. p. 319–66.
- [10] Wright KB, Miller CH. A measure of weak-tie/strong-tie support network preference. *Commun Monogr*. 2010;77:502–20. <https://doi.org/10.1080/03637751.2010.502538>.
- [11] World Health Organization. Coronavirus disease 2019 (COVID-19) situation report - 55. Accessed June 1, 2021. <https://www.who.int/publications/m/item/situation-report-55>.
- [12] Izard CE. Emotion theory and research: Highlights, unanswered questions, and emerging issues. *Annu Rev Psychol*. 2009;60:1–25.