COVID-19 Epidemic Information Needs and Information Seeking Behavior of Overseas Chinese Students

Lin Wang¹, Ziqiao Ma², and Yuwei Jiang²(✉)

¹ Academy of Chinese Science and Education Research, Hangzhou Dianzi University, Hangzhou 310018, China
² School of Management, Tianjin Normal University, Tianjin 300387, China
jiangyw_xpp@163.com

Abstract. This paper aims to explore the COVID-19 epidemic information needs and information seeking behavior of overseas Chinese students. The questionnaire survey method was adopted to collect data. The results show that personal health protection knowledge, Chinese and foreign governments’ countermeasures, control effects and future plans were the most important information needs of overseas Chinese students. The information need, quality of information sources, information source accessibility and satisfaction of information source update rate have significantly positive effects on information seeking frequency. The relationship between information needs and information seeking frequency is positively moderated by both quality of information source and satisfaction of information source update rate. On the basis of these results, this paper makes suggestions for health information services to overseas Chinese students.

Keywords: The COVID-19 epidemic · Overseas Chinese students · Information needs · Information seeking behavior

1 Introduction

The COVID-19 epidemic broke out at the beginning of 2020 and spreads rapidly all over the world. This disease was declared as a global public health emergency by the World Health Organization (WHO) and aroused the high attention globally [1]. China is one of the largest source of international students in the world. When the epidemic in China is under control, the epidemic abroad is becoming increasingly serious. This large group of overseas Chinese students is under more close attention. Overseas Chinese students attach great importance to the epidemic for the sake of safety, situation change, plans of returning to China etc. Therefore, it is of significance to investigate the epidemic information needs and information seeking behavior of overseas Chinese students. The results can enrich the existing theories of health information behavior. It can also help the students be well-informed about COVID-19 epidemic, thus reducing their possibility of having mental health problems.

© Springer Nature Switzerland AG 2021
K. Toeppe et al. (Eds.): iConference 2021, LNCS 12646, pp. 37–47, 2021.
https://doi.org/10.1007/978-3-030-71305-8_3
2 Literature Review and Research Hypotheses

Information can reduce uncertainty, thus reducing the risk of information users and make them perceive a sense of security [2, 3]. Wilson conducts pioneering research on information behavior [4]. He claims that information seeking behavior originates from information needs. It is the process of finding information purposefully to reduce uncertainty. Therefore, it is critical to fully comprehend users’ information needs in information behavior research.

There are increasing researches on the health information needs during public health emergencies. Research on the health information needs of the Vietnamese people in the COVID-19 epidemic shows that the most important health information needs during the period of national lockdown were “the latest information of disease and treatment”, “disease transmission mechanism and specific precautions” and “epidemiological symptoms, treatment and prevention” [5]. Majid et al. found that during the H1N1 pandemic in Singapore, the public’s information needs mainly include H1N1 symptoms, the causes of infection, preventive measures and possible treatment. They also demonstrated that mass media such as television, newspapers and radio were the most commonly used channels to address the information need [6]. Randle et al. report that when the ZIKV epidemic is reported by the media, the public will actively seek relevant information and health services, such as calling the epidemic hotline and requesting information about virus infection and its testing [7]. Qiao claims that information needs are the basis and motives of information behavior, and the intensity of information needs determines the possibility of information behavior [8]. Thus, we make the following hypothesis:

H1: The epidemic information needs of overseas Chinese students have a significantly positive impact on epidemic information seeking frequency.

Auster and Choo measure the quality of information sources from two dimensions: relevance and reliability [9]. The information quality tends to deteriorate in the information explosion – fake news, misinformation and disinformation are common. However, the information processing ability of users has not been improved accordingly [10]. Zhang et al. believe that there are differences in the quality of health information sources on different medical websites [11]. It is because people face such a wide range of information sources that makes it difficult for them to fully apprehend the accessed information or to identify the most reliable information source [12, 13]. The emergence of various social media has generated new challenges to the health information quality during the outbreak of the epidemic [14]. Information sources being reliable and high-quality is considered to be an important prerequisite for information users’ satisfaction [15]. Li concluded that when facing the choice of information sources, users mostly value the timeliness, authenticity, reliability [16]. Zha et al. found that the quality and credibility of information sources significantly and positively affect academic users’ search frequency [17]. The “Moore’s law” showed that accessibility influenced users’ choice of information sources [18]. Users always choose information on the psychological basis of obtaining maximum benefits with the least effort. Jin et al. [19] reveal that during the COVID-19 epidemic, amplifying the amounts of information access channels
for community residents can partly alleviate the psychological problems of community residents such as blind disinfection and sleep disorders. Therefore, we hypothesize:

H2a: Information source quality has a significantly positive impact on epidemic information seeking frequency of overseas Chinese students.

H2b: Information source quality positively moderates the relationship between information needs and information seeking frequency of overseas Chinese students.

H3a: Information source accessibility has a significantly positive influence on the information seeking frequency of overseas Chinese students.

H3b: Information source accessibility positively moderates the relationship between information needs and information seeking frequency of overseas Chinese student.

Li and Yan found that the timeliness of information update was the primary impact factor in the information seeking behavior of university graduates [20]. Based on online interview with some overseas Chinese students, we assume that the satisfaction of information source update rate is an impact factor of their information seeking behavior. We thus hypothesize:

H4a: Satisfaction of information source update rate has a significantly positive impact on the epidemic information seeking frequency of overseas Chinese students.

H4b: The relationship between epidemic information needs and information seeking frequency of overseas Chinese students is positively moderated by satisfaction of information source update rate (Fig. 1).

Fig. 1. Research model of epidemic information seeking behavior
3 Research Methods

3.1 Questionnaire Design

The questionnaire of this study has two parts: the first part is to investigate the demographic characteristics of the subjects and other specific personal information, including the participants’ gender, age, the length of overseas residence, current status; the second part is the investigation of epidemic information needs and information seeking behavior. It consisted of 12 items.

The variables measured in the second part were composed of information needs, satisfaction of information source update rate, information source accessibility, quality of information source and information seeking frequency. The items and calculation method of the information needs part are based on the Health Information Wants Questionnaire scale [21]; the satisfaction of information source update rate is a measurement based on interview; the items of information source accessibility were revised based on the research of Yitzhaki and Hammerslag [22]; As for the quality of information sources, it equals to relevance plus reliability [9]. The 5-point Likert scale was used for the items of each variable. For instance, for the items of information need, 1 means “completely unnecessary”, and 5 means “very necessary”.

3.2 Survey and Data Collection Procedure

Given the relatively similarity between different national healthcare policies, the participants of this study are overseas Chinese students and visiting scholars, who mainly study in Western countries like US and UK, etc. The questionnaire was collected on the platform of www.wenjuan.com from April 17 to April 25, 2020. This period was the outbreak period of the epidemic in Western countries. 104 questionnaires were collected in this survey, and 100 valid questionnaires were obtained after removing the questionnaires with the missing value and abnormal value. Thus, the effective rate of the questionnaire was 96.15%. Table 1 illustrates the basic information of the subjects.

We tested the reliability of Cronbach’s $\alpha$ on the items of the questionnaire, and concluded that the Cronbach’s $\alpha$ coefficient of the questionnaire is 0.920, indicating that the reliability of the questionnaire is high and ideal. Moreover, we tested the validity of the items in the questionnaire. The results show that the overall KMO value is 0.822, and the significance values of Bartlett’s sphericity test are less than 0.05, indicating that the questionnaire has good structural validity.

Secondly, we analyzed the survey data by SPSS 22.0. The hierarchical set regression analysis was adopted because many studies have shown that this method is suitable to the study of information search behavior of users by testing the impacts of each variable individually at each step [23–25]. In addition, according to Aiken, Reno and West’s suggestions [26], we adopt the method of zero-centered in regression analysis so as to avoid multi-collinearity among independent variables.
Table 1. Demographic data

| Variable                      | Subdivision variable | Number | Percentage (%) |
|-------------------------------|----------------------|--------|----------------|
| Gender                        | Male                 | 34     | 34.00          |
|                               | Female               | 66     | 66.00          |
| Age                           | 18 and under         | 2      | 2.00           |
|                               | 19–25                | 60     | 60.00          |
|                               | 26–30                | 31     | 31.00          |
|                               | 31–35                | 7      | 7.00           |
| Length of overseas residence  | Less than a year     | 24     | 24.00          |
|                               | 1 to 2 years         | 22     | 22.00          |
|                               | 3 to 4 years         | 20     | 20.00          |
|                               | More than 4 years    | 34     | 34.00          |
| Current status                | No intention of returning to China | 47 | 47.00 |
|                               | Unable to return for special reasons | 24 | 24.00 |
|                               | Has returned to China | 29 | 29.00 |

4 Analysis Results

4.1 Epidemic Information Needs of Overseas Chinese Students

The participants’ epidemic information needs are shown in Table 2. The top two information needs are personal health protection knowledge, Chinese and foreign governments’ countermeasures, control effects and future plans. They are the students’ most important information needs. Information needs with relatively lower value are punishment for illegal behaviors related to the epidemic and information about hospitals capable of treating COVID-19 disease. Overall, overseas Chinese students have great epidemic information needs.

4.2 Regression Analysis

Since there are positive correlations among variables ($P < 0.01$) as shown in Table 3, we conducted a hierarchical regression analysis. Because causality may be explained well by demographic characteristics and other specific individual variables in behavior studies, we put this kind of variables as control variables into the model at the first step [27]. After that, in each hierarchic level, we put the centered variables into the model in turn according to the conceptual model. With every step for regression, we recorded regression coefficient and standard deviation which are newly included in variables. Meanwhile, T test was carried out to observe the change of $R^2$. We also conducted the F test. The results are summarized in Table 4.
Table 2. Information Needs Statistics (N = 100)

| Ranking | Information needs                                                                 | Importance level |
|---------|-----------------------------------------------------------------------------------|------------------|
|         |                                                                                   | Mean score (1–5) | SD    |
| 1       | Personal health protection knowledge                                               | 4.30             | 0.88  |
| 2       | Chinese and foreign governments’ countermeasures, control effects and future plans | 4.23             | 0.95  |
| 3       | Timely clarification to rumors and misunderstandings of the epidemic               | 4.16             | 1.03  |
| 4       | Epidemiological features for COVID-19                                             | 4.08             | 1.01  |
| 5       | Logistics information for epidemic controlling                                    | 3.90             | 1.00  |
| 6       | Daily information for epidemic situation                                          | 3.87             | 0.99  |
| 7       | Progress of COVID-19 scientific research                                          | 3.82             | 1.06  |
| 8       | Traveling routes for affirmed cases                                               | 3.80             | 1.14  |
| 9       | Hospitals capable of treating COVID-19 disease                                     | 3.78             | 1.09  |
| 10      | Punishment for illegal behaviors related to epidemic                               | 3.67             | 1.09  |

The results show that the current status of overseas Chinese students has significantly positive influence on epidemic information seeking frequency (P < 0.05), whereas other control variables do not have such effect. Epidemic information needs have a positive influence on epidemic information seeking frequency (P < 0.01) and R² value has risen from 0.193 to 0.341. Hypothesis 1 is supported. The quality of information sources has a significantly positive impact on information seeking frequency (P < 0.01). In addition, the quality of information sources significantly positively moderates the relationship between epidemic information needs and information seeking frequency (P < 0.05). Therefore, both H2a and H2b are supported. Information source accessibility has a significantly positive impact on epidemic information seeking frequency (P < 0.01). However, the information source accessibility does not significantly moderate the relationship between epidemic information needs and information seeking frequency. Thus, H3a is supported and H3b not. H4a and H4b are supported by evidences that satisfaction of information source update rate has significantly positive impact on epidemic information seeking frequency (P < 0.05), and it also significantly positively moderates the relationship between epidemic information needs and information seeking frequency (P < 0.01). The revised model is shown in Fig. 2.
### Table 4. Results of hierarchical regression analysis

| Step 1 | Step 2 | Step 3 | Step 4 | Step 5 |
|--------|--------|--------|--------|--------|
| B      | S.E.   | t      | B      | S.E.   | t      | B      | S.E.   | t      | B      | S.E.   | t      |
| Constant | 0.462  | 0.365 | 1.267  | 0.419  | 0.332 | 1.264  | 0.423  | 0.302 | 1.400  | 0.286  | 0.287 | 0.996  | 0.265  | 0.265 | 1.003 |
| Sex     | -0.211 | 0.128 | -1.641 | -0.136 | 0.118 | -1.152 | -0.157 | 0.108 | -1.464 | -0.106 | 0.102 | -1.046 | -0.091 | 0.093 | -0.970 |
| Age     | -0.042 | 0.107 | -0.396 | -0.090 | 0.098 | -0.919 | -0.083 | 0.089 | -0.933 | -0.061 | 0.084 | -0.729 | -0.103 | 0.078 | -1.325 |
| Living style | -0.113 | 0.067 | -1.687 | -0.095 | 0.061 | -1.554 | -0.083 | 0.056 | -1.492 | -0.076 | 0.052 | -1.474 | -0.031 | 0.049 | -0.643 |
| LOR     | -0.027 | 0.102 | -0.270 | -0.007 | 0.093 | -0.073 | -0.012 | 0.085 | -0.144 | 0.011  | 0.079 | 0.139  | 0.005  | 0.073 | 0.065 |
| Current status | 0.185  | 0.073 | 2.531* | 0.157  | 0.067 | 2.363* | 0.150  | 0.061 | 2.455* | 0.104  | 0.058 | 1.787  | 0.108  | 0.054 | 1.997* |
| IN      | 0.336  | 0.074 | 4.571** | 0.324  | 0.067 | 4.818** | 0.283  | 0.066 | 4.287** | 0.232  | 0.062 | 3.759** |
| QIS     | 0.491  | 0.113 | 4.347** | 0.303  | 0.118 | 2.564* | 0.402  | 0.113 | 3.554** |
| QIS*IN  | 0.306  | 0.128 | 2.394* | 0.102  | 0.171 | 0.598  | 0.160  | 0.168 | 0.955 |
| ISA     | 0.228  | 0.066 | 3.435** | 0.072  | 0.084 | 0.865 |
| ISA*IN  | 0.159  | 0.098 | 1.626  | -0.328 | 0.148 | -2.222* |
| SISUR   | 0.215  | 0.099 | 2.176* |
| SISUR*IN | 0.519  | 0.142 | 3.656** |
| R²      | 0.193  | 0.341 | 0.464  | 0.548  | 0.628 |
| ΔR²    | 0.193  | 0.148 | 0.123  | 0.085  | 0.080 |
| F       | 4.487  | 8.014  | 9.839  | 10.771 | 12.230 |

### Table 3. Pearson correlation results

|        | ISF   | IN    | SISUR  | ISA    | QIS   |
|--------|-------|-------|--------|--------|-------|
| ISF    | 1     |       |        |        |       |
| IN     | .449**| 1     |        |        |       |
| SISUR  | .586**| .227* | 1      |        |       |
| ISA    | .584**| .287**| .772** | 1      |       |
| QIS    | .382**| .070  | .413** | .480** | 1     |

Note: **p < 0.01, *p < 0.05, ns: not significant, ISF: Information seeking frequency, IN: Information need, QIS: Quality of information source, ISA: Information source accessibility, SISUR: Satisfaction of information source update rate.
Fig. 2. Revised model of epidemic information seeking behavior

5 Discussion

The results show that hypotheses for H1, H2a, H3a, H4a are supported. Under the COVID-19 epidemic situation, information needs, quality of information sources, information source accessibility and satisfaction of information source update rate have significantly positive influences on information seeking frequency of overseas Chinese students. Qiao [8] believed that information needs are the basic motives for information seeking behavior. Our study has affirmed this statement in the pandemic context. Information is mixed with misinformation and disinformation in the infodemic. Therefore, overseas Chinese students are inclined to actively access information sources with high quality, reliability and timeliness. According to Mooers’ Law [18], the higher the information source accessibility, the more information users tend to obtain to thoroughly apprehend and grasp the epidemic situation, thus the information seeking frequency is high. The higher satisfaction of information source update rate indicates the epidemic information is timely to overseas Chinese students so that information seeking frequency becomes higher [20].

Two hypotheses of moderating effects are supported in this research. The results mean that when the epidemic information needs are given, the higher level of information source quality and satisfaction of information source update rate, information needs have more significant positive impact on information seeking frequency. During the epidemic, there were negative public opinions on overseas Chinese students both in China and abroad: Racist reports on Asian groups abroad were frequently reported in the media; In China, some people bitterly satirized overseas Chinese students who had returned through social media as well. In such situation, objective and unbiased information sources are highly appreciated by these students, which is the indicator of information quality. High quality information sources help them to maintain sense of self-identity and thus inspire them to have motives to seek more information. Information source accessibility does not positively moderate the relationship between information needs
and information seeking frequency. The possible explanation may be that for overseas Chinese students, epidemic information needs are vital for their life and health. No matter how difficult for accessing information, they will do it actively.

6 Conclusions and Limitations

This paper investigated the epidemic information needs and information seeking behavior of overseas Chinese students during COVID-19 epidemic. It found that their most important epidemic information needs are personal health protection knowledge, Chinese and foreign governments’ countermeasures, control effects and future plans. Information needs, quality of information source, information source accessibility and satisfaction of information source update rate have significantly positive influences on epidemic information seeking frequency. Meanwhile, both the quality of information sources and satisfaction of information source update rate significantly moderate the relationship between information needs and information seeking frequency.

Our findings have several implications for overseas Chinese students and epidemic information service provision. First, it is suggested that overseas Chinese students should improve their personal information literacy by self-learning and training. They should be aware of their information needs and express them clearly and accurately. They should also have knowledge of authoritative information sources and rely on these channels to access epidemic information. It is important to enhance their skills of distinguishing truth from fake news. Secondly, Chinese embassies and consulates should update the consular reminder and epidemic prevention and control information on time to ensure the students to understand policies and plans of mother-country. Thirdly, information providers should pay close attention to the quality of information sources in the infodemic and eliminate the misinformation and disinformation dissemination. They should also keep high update rate of epidemic data to help people avoid psychological problems such as anxiety and stress caused by information asymmetry or delay. Due to the limitations of sampling and other factors, there is a lack of comparison between overseas Chinese students and other countries students as far as information needs and information seeking behavior are concerned, which should be further investigated in the future.

References

1. World Health Organization. https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov). Accessed 20 Apr 2020
2. Fodness, D., Murray, B.: A model of tourist information search behavior. J. Travel Res. 37(3), 220–230 (1999). https://doi.org/10.1177/004728759903700302
3. Li, D.J.: How Chinese consumers look for commercial information: the case of Tianjin. Nankai J. 1(2), 30–35 (2001). https://doi.org/10.3969/j.issn.1001-4667.2001.02.005
4. Wilson, T.D.: On user studies and information needs. J. Document. 37(1), 3–15 (1981)
5. Le, H.T., Nguyen, D.N., Beydoun, A.S., Le, X.T.T., Nguyen, T.T., Pham, Q.T., et al.: Demand for health information on COVID-19 among Vietnamese. Int. J. Environ. Res. Public Health 17(12), 4377 (2020). https://doi.org/10.3390/ijerph17124377
6. Majid, S., Rahmat, N.A.: Information needs and seeking behavior during the H1N1 virus outbreak. J. Inf. Sci. Theory Pract. 1(1), 42–53 (2013). https://doi.org/10.1633/JISTaP.2013.1.1.3
7. Randle, J., Nelder, M., Sider, D., Hohenadel, K.: Characterizing the health and information-seeking behaviours of Ontarians in response to the Zika virus outbreak. Can. J. Public Health 109(1), 99–107 (2018). https://doi.org/10.17269/s41997-018-0026-9
8. Qiao, H.: Information Behavior, 2nd edn. Beijing Normal University Publishing House, Beijing (2010)
9. Auster, E., Choo, C.W.: Environmental scanning by CEOs in two Canadian industries. J. Am. Soc. Inf. Sci. 44(4), 194–203 (1993). https://doi.org/10.1002/(SICI)1097-4571(199305)44:4.0.CO;2-1
10. Klapp, O.E.: Overload and Boredom: Essays on the Quality of Life in the Information Society. Greenwood Publishing Group Inc, Westport (1986). https://doi.org/10.2307/4308131
11. Zhang, Y., Sun, Y., Xie, B.: Quality of health information for consumers on the web: a systematic review of indicators, criteria, tools, and evaluation results. J. Am. Soc. Inf. Sci. 66(10), 2071–2084 (2015). https://doi.org/10.1002/asi.23311
12. Beltrán, C., Sánchez, S., Gómez, S., Duque, C., Sukkarie, S., Sukkarieh, L.: Update on sources of health education in pregnant women. Rev Parainfo Digit 12, 1–7 (2011)
13. Carolan, M.: Health literacy and the information needs and dilemmas of first-time mothers over 35 years. J. Clin. Nurs. 16(6), 1162–1172 (2007). https://doi.org/10.1111/j.1365-2702.2007.01600.x
14. Macario, E., Edncacot, E.M., Ullberg, L., Reichel, J.: The changing face and rapid pace of public health communication. J. Commun. Healthcare 4(2), 145–150 (2011). https://doi.org/10.1179/175380611X13022552566254
15. Devaraj, S., Fan, M., Kohli, R.: Antecedents of B2C channel satisfaction and preference: validating e-commerce metrics. Inf. Syst. Res. 13(3), 316–333 (2002). https://doi.org/10.1287/isre.13.3.316.77
16. Li, J.: Study on the discrepancies between the perception of information quality and the use of information sources. J. Inf. Resources Manage. 4(4), 17–23,68 (2014). https://doi.org/10.13365/j.jirm.2014.04.017
17. Zha, X.J., Zhang, J.C., Yan, Y.L.: Impacting factors of users' academic information seeking behavior in the context of microblogs: a dual-route perspective of information quality and information source credibility. J. Library Sci. China 41(217), 71–85 (2015). https://doi.org/10.13530/j.cnki.jlis.150015
18. Moore, C.N.: Mooers’ Law or why some retrieval systems are used and others are not. Bull. Am. Soc. Inf. Sci. Technol. 23(1), 22–23 (1996). https://doi.org/10.1002/bult.37
19. Jin, Y.L., Jiang, M.M., Chen, Y., Zhu, L.J., Fang, Z.M., Wu, N., et al.: Association of acquisition path of epidemic information with psychological problems during period of novel coronavirus disease 2019 epidemic among community residents in Anhui province. Chinese J. Public Health 36(5), 665–667 (2020). https://doi.org/10.11847/zgggws1128505
20. Li, Y.L., Yan, X.M.: College students’ information seeking behavior during job hunting: selection and use of information sources. Document. Inf. Knowl. 5, 57–65 (2015). https://doi.org/10.13550/j.cnki.jlilis.150015
21. Boyd, B.K., Fulk, J.: Executive scanning and perceived uncertainty: a multidimensional model. J. Manage. 22(1), 1–21 (1996). https://doi.org/10.1016/S0149-2063(96)90010-0
24. Dong, X.Y., Yan, F., Liu, Q.Q., Zhang, J.N.: Perceived environmental uncertainty and environmental scanning of executives in China: an empirical study. Manage. World 6, 127–135 (2008). https://doi.org/10.1201/9781420009521.ch3

25. May, R.C., Stewart Jr., W.H., Sweo, R.: Environmental scanning behavior in a transitional economy: evidence from Russia. Acad. Manag. J. 43(3), 403–427 (2000)

26. Aiken, L.S., West, S.G., Reno, R.R.: Multiple Regression: Testing and Interpreting Interactions. SAGE Publications, New Delhi (1991). https://doi.org/10.2307/2583960

27. Cohen, J., Cohen, P., West, S.G., Aiken, L.S.: Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences, 2nd edn. Earlbaum, Hillsdale (1983)