



# Associations among eHealth literacy, social support, individual resilience, and emotional status in primary care providers during the outbreak of the SARS-CoV-2 Delta variant

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## Abstract

**Objective:** This study aimed to investigate eHealth literacy among primary care providers (PCPs) and explore its association with social support, individual resilience, anxiety, and depression during an outbreak of the SARS-CoV-2 Delta variant in Guangzhou, China.

**Methods:** A cross-sectional web-based survey was conducted in 18 community healthcare centers in Guangzhou, China. The responses of 600 PCPs were tagged as valid responses. Information pertaining to their background, eHealth literacy, anxiety, depression levels, social support, and individual resilience was also collected. Multilevel analysis was used to determine the association among the measures to account for the nested random effect of community health centers in different districts.

**Results:** Participants showed a moderate self-perceived level of eHealth literacy ( $M=30$ ,  $SD=5.8$ ). Participants who reported higher levels of eHealth literacy were more likely to exhibit lower levels of anxiety and depression, higher social support, and greater resilience. After adjusting for background characteristics, the results of the multilevel logistic analysis showed that eHealth literacy was significantly associated with anxiety and depression, social support, and individual resilience. Younger participants and those who were highly educated reported enhanced eHealth literacy.

**Conclusions:** This study presents a baseline reference for eHealth literacy among Chinese PCPs. Improving their ability to search for and use reliable web-based information was beneficial for facilitating perceived social support and raising resilience during the pandemic. Strategies to provide high-quality web-based information to PCPs to self-assess and identify psychological distress at an early stage should be encouraged.

## Keywords

eHealth literacy, anxiety, depression, social support, resilience, primary care provider, SARS-CoV-2 Delta variant

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## Introduction

In May 2021, China's healthcare system experienced an unexpectedly severe blow with the emergence of the SARS-CoV-2 Delta variant; its spread sparked a new crisis across the country.<sup>1</sup> In Guangdong (GD), this outbreak resulted in 167 confirmed cases of infection, and the peak effective reproduction number was estimated to be 3.5.<sup>1,2</sup> The rapid transmissibility associated with the new variant places a substantial burden on the healthcare

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system, owing to an increase in the number of people who require nucleic acid testing and hospital admission.<sup>3</sup> This places significant pressure on healthcare workers (HCWs), particularly frontline primary care providers (PCPs). In such circumstances, HCWs face high levels of anxiety and depression, including work intensity, workplace changes relative to daily work, and family responsibilities, which greatly exacerbate the negative impact on their mental well-being.<sup>4,5</sup>

Social support associate with an improved mental health through the direct benefit of social relationships and the indirect benefit of a “buffer effect” against stressful circumstances has been identified.<sup>6</sup> A large volume of research has shown that low levels of social support are associated with an increased risk of depression.<sup>7</sup> This association has been reported across a broad range of populations, including patients with hypertension, cancer survivors, and older individuals.<sup>8–10</sup> However, despite evidence that greater perceived social support is associated with a better subjective quality of life, the availability and suitability of social support remains a challenge.<sup>11</sup> In several studies, high levels of social support were associated with low levels of emotional problems among HCWs during the pandemic,<sup>12–14</sup> suggesting that the experience of stress can be alleviated by access to coping resources via social support. However, social support for HCWs dealing with mental health issues was not as readily available as it should be, even though the resources had been prepared for their use.<sup>15</sup> Although previous studies have indicated that positive resources and support in individuals’ social networks improve their ability to acquire and understand medical information and report a good health outcome,<sup>16</sup> HCWs’ ability to search and use reliable information or tools to acquire support from peers, colleagues, and family to sustain emotional balance when faced with threats and stress-inducing events are rarely reported. Given that the pandemic has had significant negative effects on PCPs’ mental health, guidance regarding professional social support services to manage occupational stress and common psychological distress and to improve resilience is essential to enhance their quality of life and social well-being.

Although mental health problems were widespread among HCWs prior to the pandemic, COVID-19 has added new stressors to the workplace that have intensified the emotional distress endured by HCWs.<sup>17</sup> Supporting the mental well-being of frontline HCWs is important to ensure that the healthcare system can recover from pandemics. Resilience has been identified as a central element of HCWs’ well-being that enables them to not only “bounce back” from challenges but also to grow stronger during the process.<sup>18</sup> Empirical evidence from several countries has demonstrated that an adverse relationship existed between resilience and mental health.<sup>19–25</sup> Providing a workforce with reliable and accurate

information on self-care was shown to increase psychological resilience.<sup>26</sup> However, although the need to support the mental health of frontline HCWs has been recognized, there is a paucity of studies that provide evidence-based guidance on how to provide psychosocial support during the pandemic to help enhance their resilience for which structural and systemic barriers are reported to exist.<sup>27</sup> To provide psychological support, using a variety of methods—which enable HCWs to choose an approach for strengthening their resilience that works best for them—has been encouraged.<sup>28</sup> Providing innovative methods such as telemedicine, video chats, or online forums for HCWs to receive support is critical for promoting their resilience.<sup>29</sup> However, reports on the association between HCWs’ ability to search for and use such information and their individual resilience are rare.

The Internet has become an important channel for the public to obtain a variety of health information in China. In particular, during the pandemic, an increasing number of Chinese people, including HCWs, used social media to access information about COVID-19, such as the development of the disease, prevention strategies, and control measures.<sup>30</sup> An Australian study indicated that healthcare professionals who had participated in Internet-based treatment programs for anxiety and depression rated them significantly more acceptable than those who had never participated in such programs.<sup>31</sup> An American study reported that professionals who worked in mental healthcare services were more likely to show a positive attitude toward the use of digital health interventions for the management of mental health problems.<sup>32</sup> As a result of the pandemic, people have been urged to deploy effective digital tools to search for information, connect with others, and support mental health.<sup>33</sup> A recent systematic review showed that the pandemic has had a huge impact on Internet searches for mental health globally.<sup>34</sup> However, as the first contact point in the fight against the COVID-19 pandemic and the backbone force engaged in each phase of the response to the virus, PCPs are highly likely to experience impaired mental health.<sup>35,36</sup> Their ability to search for and use web-based information to manage their mental health has not been reported in previous research.

Although the Internet has been identified as a key means of accessing resources relevant to mental health during the pandemic,<sup>37</sup> ensuring the quality and reliability of online information is far from simple. eHealth literacy has been increasingly identified as an essential ability for making informed choices regarding health promotion and disease prevention and management.<sup>38</sup> eHealth literacy has been shown to be associated with decreased psychological distress,<sup>39</sup> increased engagement in mental health-enhancing actions,<sup>40</sup> and reduced anxiety associated with seeking online health information<sup>41</sup> among different populations; however, such studies have rarely focused on medical

professionals. Alnazly et al.<sup>13</sup> showed that eHealth literacy may be significantly associated with low anxiety, depression, and other poor mental health outcomes among nurses. Another study reported an association between eHealth literacy and psychological well-being in a Chinese sample.<sup>42</sup> However, few studies have investigated the association between eHealth literacy and mental health outcomes among PCPs, whose work-related stress has been amplified by the pandemic.

Furthermore, given the complicated techniques that may pertain to the use of hardware and software systems, using online information to manage health has been reported as a source of frustration for medical professionals.<sup>43,44</sup> Additionally, web-based information is reported to both alleviate and sometimes increase stress, depending on the reliability of the information source and the way the information is used.<sup>45</sup> Thus, although the Internet has become the main source of mental health information worldwide, the lack of proper regulation means that its quality remains questionable, and it is difficult to judge the reliability of health information on the Internet. Given that the pandemic is acting as a catalyst for the digitization of mental health-related services and the provision of social support in web-based health communities, there is a need for a preliminary understanding and critical evaluation of PCPs' ability to search for and use reliable web-based information to manage their mental health and improve their social well-being. Thus, this study aimed to investigate eHealth literacy among PCPs and examine its association with social support, individual resilience, anxiety, and depression in Guangzhou, China.

## Methods

### Participants and data collection

The data used in this study were obtained from a web-based multicenter survey that investigated the relationship between workload and work-related burden among medical providers in primary care centers in Guangzhou, China. The study period was from May to July 2021, during which the SARS-CoV-2 Delta variant was prevalent in local communities. All actively employed PCPs (i.e. doctors, nurses, and public health professionals) and other supporting staff (e.g. pharmacists, radiologists, and physiotherapists) from community health centers in four districts (Baiyun, Huangpu, Tianhe, and Yuexiu) were invited to participate in the survey. Part-time staff and those who did not go to work in the last two weeks (the onset of the outbreak) were excluded from the survey. The research team collaborated with the managers of each center to manage the survey process. A link including the questionnaire, developed using Wenjuanxing, a web-based survey company, and study information was sent directly to all eligible participants through using the social network

WeChat (a multipurpose instant messaging app). Questionnaires were required to be completed within one week after the link was sent. All questionnaires were anonymous, and no personal identities were disclosed in this survey. Because only the information of those who completed all questions and successfully submitted the questionnaire could be recorded by the online survey system, no response rate was calculated. Regarding the sample size, we assumed a margin of error of 5%, a confidence level of 95%, and a response distribution of 50%. The total number of PCPs in Guangzhou was 11,200, according to Guangzhou Health statistics 2020. A minimum sample size of 372 participants was determined. The Ethics Committee of the Southern Medical University approved the study protocol and the contents of the informed consent statement (Ref ID: NFKDX002).

### Measures

**eHealth literacy scale.** The eHealth literacy scale (eHEALS) was used to measure participants' knowledge and skills regarding finding, evaluating, and applying online health information to manage their health. It consists of eight items rated on a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). The sum score for eHEALS ranges from 8 to 40, with a higher score indicating better perceived eHealth literacy. The psychometric properties of the eHEALS in the Chinese population have been reported in several studies.<sup>46–48</sup> In this study, Cronbach's alpha for eHEALS was 0.95.

**Social support self-rating scale.** The social support self-rating scale (SSRS) was used to measure the participants' perceived social support. The SSRS consists of 10 items that measure three domains of social support: subjective support, objective support, and support-seeking behavior. The total score for the SSRS ranges from 12 to 66 and is classified into three levels of support: low (22 and below), moderate (23–44), and high (45 and above). Xiao<sup>49</sup> and Gu<sup>50</sup> have reported the psychometric properties and performance of the SSRS in the Chinese population. In this study, Cronbach's alpha of the SSRS was 0.77.

**Brief resilience scale.** The brief resilience scale (BRS), which consists of six items, was used to measure participants' individual resilience.<sup>51</sup> All items are rated on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). The sum score for the BRS ranges from 1 to 5 (calculated by dividing the total sum by the total number of questions answered). Resilience can be classified into three categories: low (1–2.9), normal (3–4.2), and high (4.3–5.0).<sup>51</sup> The performance and psychometric properties of the BRS in Chinese population are reported by Lai et al.<sup>52</sup> and Fung.<sup>53</sup> In this study, the Cronbach's alpha for the BRS was 0.82.

**Hospital anxiety and depression scale.** The hospital anxiety and depression scale (HADS) is a self-reported instrument consisting of two subscales designed to measure two emotional disorders: depression (HADS-D) and anxiety (HADS-A).<sup>54</sup> Depressive and anxiety symptoms during the previous week were reported on a four-point Likert-type scale ranging from 0 (not at all) to 3 (most of the time). The sum score for each subscale ranges from 0 to 21 and is categorized as normal (0–7), borderline (8–11), or abnormal (12 and above). HADS is a valid instrument for measuring mental health in different Chinese populations.<sup>54,55</sup> In this study, the Cronbach's alphas of the HADS-A and HADS-D were 0.8 and 0.88, respectively.

### Statistical analysis

Descriptive analysis was used to describe participants' background characteristics and other basic data attributes. Participants' eHealth literacy is presented as mean ( $M$ ) and standard deviation ( $SD$ ). Anxiety and depressive status, social support, and personal resilience were expressed as proportions and percentages, based on their categories. The chi-square test, Wilcoxon signed-rank test, and Kruskal–Wallis test were used to examine the intergroup differences. The Pearson correlation coefficient ( $r$ ) was used to assess the association among the measures, where  $r$  equal to or more than 0.3 and  $r$  equal to or more than 0.5 were identified as moderate and large effects, respectively.<sup>56</sup> To simplify the data analysis and present the score distributions, the minimum–maximum normalization method was used to convert the sum score to a standardized range of 0 to 100 for all measures.

To account for the nested random effect of community health centers in different districts, a multilevel analysis

was conducted. The outcomes for eHEALS were calculated as both continuous and categorical variables (below the median and equal to or more than the median) in this study. To identify which model showed better performance in estimating the association among eHealth literacy, depression, anxiety, social support, and individual resilience, both linear and binary logistic mixed-effects models were used. All models were adjusted according to participant characteristics. The beta coefficient ( $\beta$ ) and odds ratio (OR) with a 95% confidence interval (95% CI) were used to present the results from the linear and logistic models, respectively. The Akaike information criterion and Bayesian information criterion were used to assess model performance, and only better-fit models were used. The complete results of the multilevel analysis are presented in the Supplemental Appendix. The  $p$ -value  $\leq 0.05$  was regarded as statistically significant. All analyses were performed using R software.

### Results

A total of 600 PCPs completed the questionnaires and provided valid responses. Approximately 78% were female, more than half were younger than 35 years, and nearly 80% had completed tertiary or higher education. Approximately 30% were doctors, 35% were nurses, 21.3% were support staff, and the remainder were public health professionals. The mean eHEALS score was 30. Participants who were young (35 years or less), highly educated (tertiary education or above), and unmarried showed significantly higher eHealth literacy (Table 1).

Table 2 shows that the correlations among all measures were statistically significant. The eHEALS was weakly associated with the other measures. The SSRS was moderately correlated with HADS-D, HADS-A and BRS.

**Table 1.** Participants' characteristics and associated eHealth literacy level.

	$n$	%	eHEALS	
			Mean( $SD$ )	$p$ -value
Overall	600	100	30(5.3)	
Sex				
Male	129	21.5	29.2(5.6)	0.06
Female	471	78.5	30.2(5.2)	
Age group				
$\leq 35$	306	51.2	30.5(5.3)	<0.001
>35	292	48.8	29.5(5.2)	

(continued)

Table 1. Continued.

	<i>n</i>	%	eHEALS	
			Mean(SD)	<i>p</i> -value
Education				
Secondary or below	132	22	28.9(5.2)	0.001
Tertiary or above	468	78	30.3(5.2)	
Marital status				
Married	488	81.3	29.8(5.3)	0.02
Unmarried	112	18.7	30.8(5.3)	
Employment status				
Permanent contract	386	64.3	30.2(5.4)	0.5
Temporal contract	214	35.7	29.7(5)	
Working years				
≤5 years	261	43.5	30.2(5.1)	0.14
6–10 years	224	37.3	30.2(5.2)	
>10 years	115	19.2	29.3(5.7)	
Profession				
Doctor	192	32	30.3(5.7)	0.13
Nurse	207	34.5	29.8(5)	
Public Health professionals	73	12.2	30.4(5.7)	
Supporting staff	128	21.3	29.5(4.7)	
Health center in district				
Baiyun	373	62.2	30.1(5.4)	0.3
Huangpu	75	12.5	30(5.2)	
Tianhe	96	16	30.5(4)	
Yuxiu	56	9.3	28.3(6.2)	

Additionally, BRS was strongly correlated with HADS-A and HADS-D.

Table 3 shows that 41.5% and 37% of the participants reported an abnormal status in terms of anxiety and depression, respectively. Participants with higher eHealth literacy were more likely to report lower levels of anxiety and

depression, regardless of whether the eHEALS score was identified as a continuous or categorical variable. Participants who showed stronger social support and higher individual resilience reported higher eHealth literacy than did those who showed moderate or lower social support and low or normal resilience.

**Table 2.** Correlations between measures.

	1	2	3	4	5	6	7	8
1. eHEALS	1							
2. HADS-Anxiety	-0.29***	1						
3. HADS-Depression	-0.29***	0.7***	1					
4. SSRS-Overall	0.16***	-0.32***	-0.43***	1				
5. SSRS-Subjective factor	0.1*	-0.31***	-0.36***	0.89***	1			
6. SSRS-Objective factor	0.17***	-0.22***	-0.33***	0.82***	0.53***	1		
7. SSRS-Behavior seeking factor	0.12**	-0.19***	-0.32***	0.59***	0.35***	0.39***	1	
8. BRS	0.25***	-0.57***	-0.56***	0.33***	0.37***	0.29***	0.26***	1

eHEALS: eHealth literacy scale; HADS: hospital anxiety and depression scale; SSRS: social support self-rating scale; BRS: brief resilience scale.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

Figure 1(A) shows the score distribution for all the measures. The HADS-A and HADS-D scores showed a right-skewed distribution, indicating that most participants reported a low level of depression or anxiety. The BRS score was left-skewed, indicating that a high proportion of participants reported a moderate or high level of individual resilience. Figure 1(B) shows the effect of variations in the relationships of eHEALS with HADS, SSRS, and BRS while stratified by district. The heterogeneous results confirmed that the random effect of districts should be considered when estimating the association between eHealth literacy, anxiety, depression, social support, and resilience.

According to the multilevel logistic analysis, after adjusting for participants' background characteristics, statistically significant associations were observed among eHealth literacy, anxiety, depression, social support, and individual resilience (Table 4). Compared with those with abnormal anxiety, participants who indicated borderline anxiety or normal anxiety were more likely to report high eHealth literacy. Participants who indicated borderline or normal depression were highly likely to have high eHealth literacy. Furthermore, there was an 82% increase in eHealth literacy when participants received high social support. Participants with high individual resilience were more likely to report high eHealth literacy. The ORs for education and age significantly increased and decreased, respectively, as eHealth literacy increased.

## Discussion

Most previous studies that measured eHealth literacy focused on patients or medical students, this is the first study to investigate eHealth literacy in a sample of PCPs

and evaluate its association with anxiety, depression, social support, and individual resilience during the outbreak of the SARS-CoV-2 Delta variant in China. Participants in our sample reported eHEALS scores similar to those of Chinese patients in a previous study.<sup>46</sup> PCPs equipped with adequate eHealth literacy demonstrated high social support and individual resilience, and reported less perceived depression and anxiety. Additionally, the data used in this study were obtained during the first wave of the outbreak of the Delta variant in China, occupational mental disorders were likely to be highly prevalent during the data collection period because PCPs were on the frontline of the battle against the new variant. Although the literature shows that healthcare professionals place high value on the provision of training to reduce the risk of psychological distress during pandemics,<sup>57</sup> our current results also showed a positive association between improved eHealth literacy and the maintenance of mental health and development of individual resilience.

The psychological mechanisms of social support, resilience, and psychological problems have been well explained in previous studies;<sup>58,59</sup> however, the mechanisms through which eHealth literacy influences mental health are largely unclear. Our findings may offer important insights, we defined eHealth literacy as an ability to information seeking and using, as this is identified as a possible mechanism for its association with web-based social support to increase resilience to decrease cognitive reactivity, emotional reactivity, and worry. However, due to the cross-sectional design, our data do not allow causal examination of mechanisms to understand such. The mechanisms and processes of improving eHealth literacy to reduce risks of mental health problems and the effects of other mediated factors remain to be further explored.



**Table 3.** Mean score of eHEALS and outcomes of HADS, SSRS, and BRS stratified by the eHEALS.

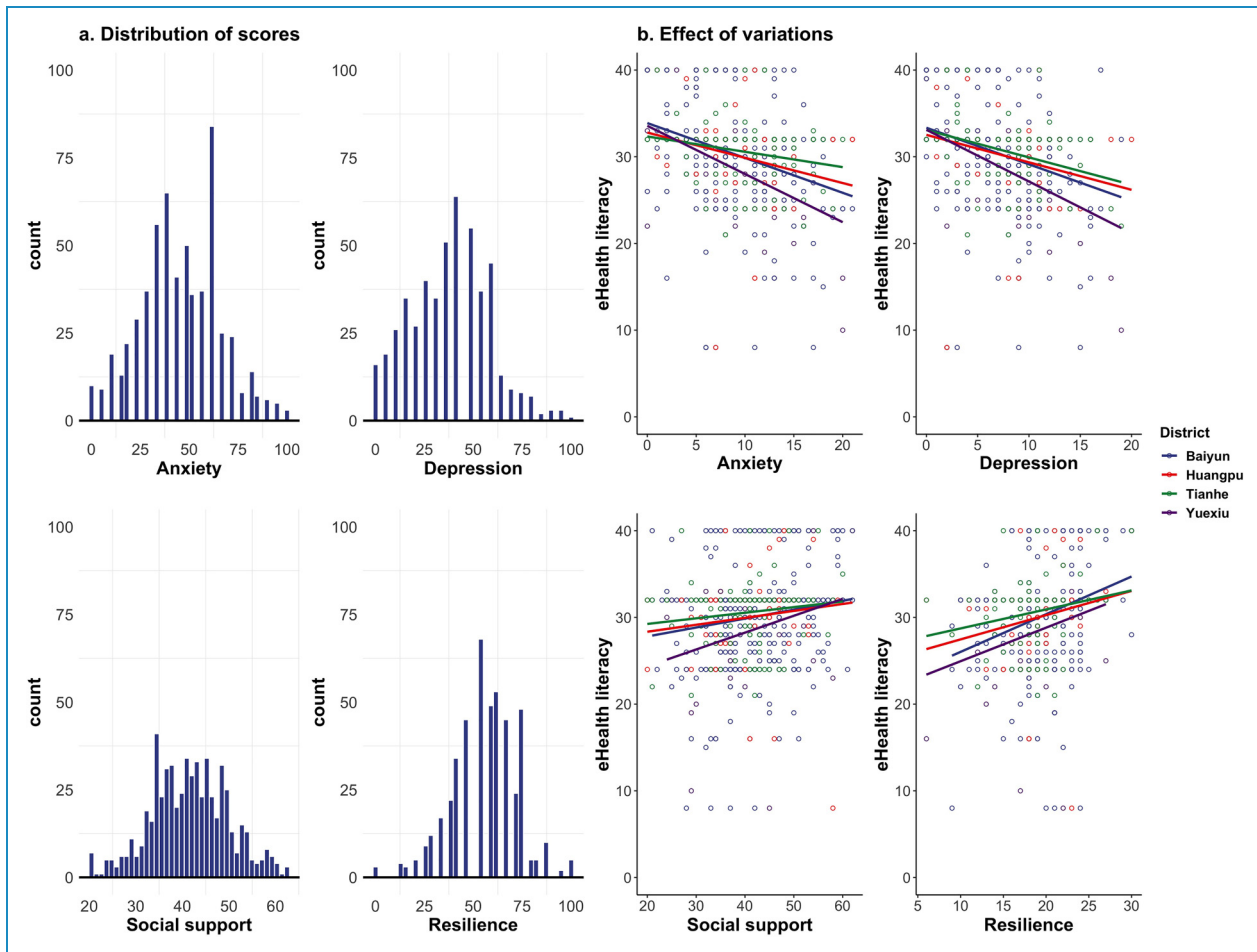
	eHEALS					
	<i>n</i> (%)	Mean (SD)	<i>p</i> -value	<i>n</i> (%)		<i>p</i> -value
				<Median	≥Median	
eHEALS	–	–	–	262(56.3)	338(43.7)	–
HADS-Anxiety						
Normal	195(32.5)	31.4(5.5)	<0.001	63(24)	132(39.1)	<0.001
Borderline	156(26)	30.9(4.1)		52(19.8)	104(30.8)	
Abnormal	249(41.5)	28.3(5.3)		147(56.1)	102(30.2)	
HADS-Depression						
Normal	249(41.5)	31.8(5.4)	<0.001	72(27.5)	177(52.4)	<0.001
Borderline	129(21.5)	30.1(3.4)		52(19.8)	77(22.8)	
Abnormal	222(37)	27.9(5.3)		138(52.7)	84(24.9)	
SSRS						
Moderate or below	385(64.2)	29.6(5.2)	0.004	183(69.8)	202(59.8)	0.01
High	215(35.8)	30.8(5.4)		79(30.2)	136(40.2)	
BRS						
Low	154(25.7)	29(4.9)	<0.001	79(30.2)	75(22.2)	<0.001
Normal	424(70.7)	30.1(5.2)		181(69.1)	243(71.9)	
High	22(3.7)	35.5(4.8)		2(0.8)	20(5.9)	

eHEALS: eHealth literacy scale; HADS: hospital anxiety and depression scale; SSRS: social support self-rating scale; BRS: brief resilience scale.

The association between eHealth literacy with psychological disorders has been reported in different populations.<sup>39,42</sup> However, there is no evidence of a relationship between eHealth literacy, anxiety, and depression in PCPs. Medical training and frontline practice can be extremely stressful, and may increase the risk of mental disorders. A recent review indicated that digital health resources were beneficial for mitigating burnout, depression, and suicidal thoughts and behaviors among medical students.<sup>60</sup> Moreover, the widespread availability of medical information on the Internet has had a profound impact on healthcare service delivery.<sup>60</sup> Specifically, Podichetty et al.<sup>61</sup> found that over 90% of physicians used the Internet to research clinical issues, making it the most common professional Internet activity for physicians. Furthermore, given the impact of lockdown and the risk of

infection for patients and health workers, e-medicine is being embraced as never before.<sup>62</sup> However, similar to patients,<sup>63,64</sup> a lack of ability to assess the reliability of online information may lead to a high level of stress among healthcare professionals, who may be concerned that their services cannot meet patients' needs and might make them less competitive than other providers.<sup>65</sup>

Health literacy and social support have been emphasized in previous studies that have focused on individual and environmental factors with regard to positive health outcomes.<sup>66,67</sup> However, the association between eHealth literacy and social support-seeking behavior in PCPs has not been studied. Additionally, the COVID-19 pandemic has prompted the frequent use of social media to develop close emotional bonds with family members and the community. Nonetheless, although social interaction has been



**Figure 1.** Score distribution of and effect of variation between the measures.

seen as an important means to help medical providers manage uncertainty,<sup>68</sup> interpret life experiences,<sup>69</sup> and advance toward their goals,<sup>70</sup> there is a paucity of studies examining its association with eHealth literacy. Amid the widespread use of the Internet and social media, our research showed that medical professionals with higher eHealth literacy reported more satisfactory social support. A previous systematic review showed that approximately 60–90% of doctors accessed the Internet in their daily practice. Although most of the related activities were associated with checking emails and searching for information in journals and databases, they also engaged in a wide range of other activities, such as communicating with colleagues.<sup>71</sup> Another systematic review indicated that online social media is extensively used by healthcare professionals as an essential tool for health promotion, career development and promotion, recruitment, professional networking, destressing, and public healthcare issues.<sup>72</sup> Aside from these discussions, we believe that improving eHealth literacy in medical professionals may be a long process, so the long-

term association between eHealth literacy and quality of life, social networks, and professional competency needs to be further explored.

Although previous studies have confirmed that health literacy is an essential element of healthcare professionalism and resilience,<sup>73,74</sup> this is the first study to show a positive association between improved eHealth literacy and strong individual resilience among PCPs. COVID-19 is likely to become an endemic disease, and coexistence with it seems inevitable.<sup>75</sup> Considering this, our exploration of the prevalence of the hypercontagious Delta variant provides clear and opportune evidence that PCPs who are good at using online information and platforms may be more likely to maintain relatively stable psychological functioning (or be able to restore it) than those with low eHealth literacy. Further, individual resilience, when considered as a framework, can facilitate the understanding of frontline medical professionals' persistent capacity to overcome and rebound from adversity. This can aid in the consolidation of COVID-19 guidelines and provide



**Table 4.** Multi-level analysis of associated eHealth literacy with anxiety, depression, social support and individual resilience.

	Odds ratio (95% C.I.)			
	Model 1 <sup>a</sup>	Model 2	Model 3	Model 4
<b>HADS-Anxiety<sup>b</sup></b>				
Abnormal	ref	–	–	–
Borderline	2.38(1.15,4.93)*	–	–	–
Normal	3.17(1.95,5.15)***	–	–	–
<b>HADS-Depression</b>				
Abnormal	–	ref	–	–
Borderline	–	2.21(1.13,4.3)*	–	–
Normal	–	4.33(2.71,6.91)***	–	–
<b>SSRS<sup>c</sup></b>				
Moderate or below	–	–	ref	–
High	–	–	1.82(1.26,2.62)*	–
<b>BRS<sup>d</sup></b>				
Low	–	–	–	ref
Normal	–	–	–	1.37(0.94,2.02)
High	–	–	–	10.21(2.27,45.85)**
<b>Sex</b>				
Male	ref	ref	ref	ref
Female	1.53(0.97,2.42)	1.54(0.98,2.45)	1.49(0.96,2.31)	1.55(1,2.41)
<b>Age group</b>				
<= 35				
>35	0.59(0.38,0.89)*	0.54(0.36,0.83) **	0.58(0.38,0.87)**	0.6(0.4,0.9)**
<b>Education</b>				
Secondary or below	ref	ref	ref	ref
Tertiary or above	1.67(1.06,2.64)*	1.65(1.04,2.61)*	1.6(1.03,2.47)*	1.5(0.97,2.33)
<b>Marital status</b>				
Married	ref	ref	ref	ref

(continued)

Table 4. Continued.

	Odds ratio (95% C.I.)			
	Model 1 <sup>a</sup>	Model 2	Model 3	Model 4
Unmarried	0.86(0.52,1.4)	0.89(0.54,1.47)	0.67(0.41,1.08)	0.76(0.48,1.22)
Employment status				
Permanent contract	ref	ref	ref	ref
Temporal contract	0.89(0.59,1.34)	0.88(0.58,1.33)	0.88(0.59,1.31)	0.9(0.61,1.34)
Working years				
≤ 5 years				
6–10 years	1.02(0.67,1.57)	1.03(0.67,1.58)	1.01(0.67,1.53)	1.02(0.68,1.55)
>10 years	0.89(0.51,1.55)	0.95(0.54,1.67)	0.98(0.57,1.68)	0.97(0.57,1.66)
Profession				
Doctor	ref	ref	ref	ref
Nurse	0.8(0.5,1.29)	0.82(0.51,1.31)	0.74(0.47,1.17)	0.77(0.49,1.22)
PH professionals	1.03(0.56,1.89)	1.03(0.56,1.9)	0.93(0.52,1.66)	0.93(0.52,1.66)
Supporting staff	0.64(0.38,1.08)	0.64(0.38,1.07)	0.69(0.42,1.13)	0.69(0.42,1.14)
Random effect of district				
Variance (SD)	0.06(0.25)	0.06(0.25)	0.45(0.67)	0.35(0.59)
Log-likelihood	−373.1	−365.7	−374.5	−372.5
AIC	784.2	769.4	785	783.1
BIC	867.7	852.9	864.1	866.6

AIC: Akaike information criterion; BIC: Bayesian information criterion.

<sup>a</sup>Reference level is “low eHealth literacy.”

<sup>b</sup>HADS: hospital anxiety and depression scale.

<sup>c</sup>SSRS: social support self-rating scale.

<sup>d</sup>BRS: brief resilience scale.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

decision-makers with relevant information to develop policies that help manage and preserve the workforce necessary to handle future public health crises.<sup>76</sup>

Currently, PCPs may seek information on the Internet, but there is no guarantee that it will be appropriate, accurate, or helpful. Interventions about collaborative learning strategies can be applied to improve PCPs' computer and web skills and knowledge about online supporting communities or groups. Furthermore, web-based mindfulness courses and cognitive-behavioral therapy-based

interventions can also be provided to improve PCPs' ability to manage working stress. Furthermore, training in enhancing skills about the dissemination of web-based health information should be offered to PCPs, which could help them to better serve the community, develop good relationships with their patients, and reduce work burnout.

This study has several limitations. First, this was a cross-sectional study; although associations between eHealth literacy and anxiety, depression, social support, and

individual resilience among PCPs were statistically significant, no causal conclusions could be drawn. Second, participants were invited to participate in the survey voluntarily, which may have led to a selection bias. Third, although all eligible PCPs from the targeted community healthcare centers were invited to participate in this survey, those who were not regular Internet users were excluded from the survey, which may also have resulted in selection bias. Fourth, all participants in this study were from a single city in China, which may have led to selection bias and negatively affected the generalizability of our findings. Fifth, all information collected in this survey was self-reported (e.g. eHealth literacy was not assessed objectively), which may have contributed to a response bias. Finally, a non-response bias existed because only a fully completed questionnaire could be submitted and recorded by the online surveying system.

## Conclusions

Our findings provide empirical evidence regarding eHealth literacy among Chinese PCPs. Social and emotional support, which are major factors that improve individual resilience in response to pandemic-related stress, were found to be positively associated with eHealth literacy. PCPs may benefit from interventions to improve their eHealth literacy, including more active informational involvement and emotional support. Future studies may shed light on strengthening the management of information quality in PCPs. The development of strategies to provide high-quality web-based information for PCPs to self-assess and identify psychological distress early should be encouraged. The benefits of offering web-based social support tools to PCPs in maintaining mental well-being and raising resilience during times of crisis should be investigated further.

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