Disentangle the elderly’s positive coping behavior in times of COVID-19: Perspectives from the social network, information acquisition, and perceived community support

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Research Article

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Abstract

Background

The global COVID-19 pandemic has devastatingly affected human well-being, especially for the elderly, who are more vulnerable to virus infection. However, scientific research and corresponding suggestions on how to help them cope positively with COVID-19 are emergently needed.

Method

Based on preliminary interviews with potential factors that may affect the elderly's positive coping behavior, this study investigated 916 Chinese elderly (aged 60–96) and disentangled the impact of social network (i.e., network size, network strength, and network heterogeneity), information acquisition (i.e., depth and breadth of information), and perceived community support on the elderly's COVID-19 positive coping behavior.

Results

Our results showed that social network (network strength and heterogeneity) and information acquisition are directly associated with positive coping behavior and indirectly through perceived community support.

Conclusions

Our findings enrich the theoretical literature on the elderly's positive coping behavior in times of COVID-19 and provide new perspectives on how to help the elderly cope with health crises from the perspective of social network, information acquisition, and perceived community support.

Background

The outbreak of the Coronavirus Disease 2019 (COVID-19) has led to global public health crises that seriously posed threats to individuals’ well-being, especially to those who are in a more vulnerable age group (e.g., the elderly) [1]. Studies have shown that the elderly with weaker immune function constitute a susceptible and high-risk group in coping with the COVID-19 pandemic [2, 3]. It was also suggested that if the elderly could adopt positive coping strategies such as governmentally prescribed or discretionary behaviors (e.g., wearing masks and washing hands frequently), their infection rate would be significantly reduced [4, 5, 6]. World Health Organization (WHO) has long recommended the use of masks in communities as part of the comprehensive prevention and control measures to limit the spread of COVID-19 [7] and as a pro-environmental and healthy personal hygiene behavior that is effective in protecting people from the infection [8]. Comprehensive infection prevention and control measures were
implemented worldwide, including paying attention to hand hygiene, wearing masks, and maintaining social distancing [9, 10, 11]. These governmental interventions have indeed reduced the spread of COVID-19 [12, 13, 14]. However, little is known regarding the strategies for and effects of the elderly's COVID-19 positive coping behavior in this particular period. Therefore, this study raises the issue of strengthening the COVID-19 positive coping behavior of the elderly to improve their health and well-being during such turbulent pandemic challenges.

Research on positive coping behavior of the elderly has been accumulating in recent years [15, 16, 17]. Coping, defined as “conscious and volitional efforts to regulate the emotion, cognition, behavior, physiology, and environment in response to stressful life events or circumstances” [18], is generally conceptualized as a two-dimensional construct, namely, approach coping and avoidance coping [19]. Some studies suggested that the elderly constitute a high-risk group and that their positive coping responses should be boosted (e.g., vaccine responses) [20] because of a strong reported association between age and mortality risk [21]. Research has shown that age is a risk factor for complications and related mortality [22]. In particular, the elderly with chronic medical conditions has the highest risk of contracting and dying from severe COVID-19 cases [23]. In this context, the quality of life of elderly is facing tough challenges [24]. Therefore, WHO recommends encouraging families to provide practical and emotional support to help the elderly take preventive measures (e.g., wearing masks, maintaining social distancing, and washing hands) [7, 9, 10]. Because adopting appropriate positive behaviors help encourage their physical activities and psychological well-being [23]. Other evidence has also suggested that greater use of proactive coping strategies is associated with a lower level of COVID-19 pandemic-related stress among the elderly compared with the younger group [25, 26]. However, strategies for the COVID-19 positive coping behavior of the elderly have not been adequately addressed yet. Previous literature has indicated that the elderly’s coping behavior is affected by various social factors, such as coping mechanisms and social support [1]. In addition, the elderly's coping behavior is influenced by crucial factors such as their gender, age, self-care ability, and assessment of COVID-19 information provided by the government [3]. More importantly, the elderly’s COVID-19 positive coping behavior is affected by their social network resources at the individual level and their psychological resources at the community level [27, 28]. In a similar vein, due to the different research findings, determining the influence factor of the elderly’s coping behavior is critical in this new context. It warrants further research to develop targeted intervention programs and policies designed to help reduce the risk of infection in this population. Furthermore, the source of information acquired (i.e., from social media) can also change people's attitudes and behavior [29]. For instance, the spread of highly infectious COVID-19 can speed up the dissemination of related rumors to a certain extent [30].

Hence, building on the preliminary interviews with twenty Chinese elderly for the top factors that may contribute to positive coping behavior, this paper intends to explore these factor-related strategies through the lens of the social network, information acquisition, and perceived community support that may predict the elderly’s positive coping behavior in the context of the COVID-19 pandemic. This work, in this sense, maps suggestions for practical strategies to tackle current global challenges posed to the elderly by testing the proposed hypothetical model.
Development of the model

The proposed conceptual model (see Fig. 1) is developed to investigate the predictors (i.e., social network, information acquisition, and perceived community support) of positive coping behavior of the elderly during the COVID-19 pandemic based on the preliminary interview and literature review.

The first predictor is social network. As the primary tool for the elderly to interact with society, the social network plays a vital role in response to sudden changes in the outside environment [31], such as the COVID-19 pandemic [1, 11]. Meanwhile, studies have shown that streetscape greenery boosts the walking behavior of the elderly to a certain extent [32], which may bring them to social network in the light that people and their surroundings are dynamic and interactive. At the same time, coping behavior may differ among people due to personal differences (e.g., gender, age, intelligence level, response to previous stressors, mood, and self-efficacy) [33, 34]. Studies have exhibited that social network could affect the coping mechanism to deal with high-stress situations [35]. It is, therefore, of great significance to study the influence of the social network on the positive coping behavior of the elderly during the COVID-19 pandemic.

The second predictor, information acquisition, has been demonstrated to be significant in coping with risks among the public [36, 37, 38]. The wider the dissemination of risk information, the more regular the risk aversion behavior is [39]. An investigation of patients with multiple sclerosis indicated that people who are satisfied with the information acquired are more inclined to take active measures to cope with their diseases [40]. Compared with other age groups, the elderly are not good at seeking and identifying the information they need from various information platforms that young people generally rely on [41]. Older people are more inclined to trust traditional media, such as newspapers and television news, than younger ones, who are more prone to new media [42]. Therefore, the elderly may eventually become victims of online misinformation because the breadth and depth of information they can access are limited [43, 44, 45]. In this sense, information acquisition (both breadth and depth) is essential for the elderly to take correspondingly appropriate coping strategies to deal with COVID-19 prevalence.

The third predictor is the community support those elderly individuals can feel, namely perceived community support. In the context of the COVID-19 pandemic, some research points out that supports provided by the community’s pandemic prevention have a positive and significant impact on adopting its residents’ prevention strategy [46, 47]. That means social support provided by the community can directly and effectively reduce depressive and anxiety symptoms of the corresponding community residents [47], and strengthening the public’s perceived social support can indeed effectively alleviate people’s anxiety and promote their well-being [48]. Many studies have found a close relationship between the social network and perceived social support, such as perceived community support [49, 50, 51]. The better the social network of the elderly, the more they can perceive the support of the community to obtain better subjective well-being; On the contrary, those who do not have close social network relationships with their families or friends, and those who rely only on the support of voluntary services or social care, are faced with additional risk [52, 53]. In addition, the level of perceived social support, which varies with factors
such as age, significantly impacts one’s coping behavior to maintain health [54, 55, 56]. With the research that underscores the critical role of perceived community support in the sustainability of social network [50], we assume that community support perceived by the elderly through their social network is positively associated with their positive coping behavior. Put another way, perceived community support mediates the relationship between social network and positive coping behavior.

Numerous studies have identified the relationship between information acquisition and community support [57, 58]. Coping with daily-life hassles is a complex issue requiring the involvement of various efforts and strategies [59], such as strategies for information seeking [41], so good information access can enhance people's perception of community support and other services. Prior research has pointed out that community-based interventions should consider improving perceived community resilience by making more information-seeking channels available for residents to improve disaster preparedness [60]. In addition, previous studies have also provided evidence for the impact of perceived community support on individual behavior [61, 62]. Liu et al. found that individuals supported by organizations tend to show organizational citizenship behavior (involving different types of community participation behavior, such as information sharing, knowledge contribution, thematic discussion, community interaction, etc.) according to the theory of organizational support [63]. These shreds of evidence provide the rationale for the hypothesis that perceived community support may exhibit a mediating role between information acquisition and positive coping behavior.

Based on the above-mentioned theoretical reasoning and grounded on prior empirical evidence, four specific hypotheses embedded in our conceptual model (see Fig. 1) are proposed in this study: (1) Social network (network size, network strength, and network heterogeneity) positively relates to the elderly's positive coping behavior; (2) Information acquisition has a positive impact on the elderly’s positive coping behavior; (3) Perceived community support mediates the relationship between the social network and positive coping behavior; (4) Perceived community support mediates the relationship between information acquisition and positive coping behavior.

**Methods**

**Procedure and participants**

Our sampling survey targets the elderly over 60 years old. With the assistance of our research collaborators (i.e., community administrative and research associates who either worked or lived in the community), we recruited the first batch of participants who met the criteria. Since it was inconvenient for some seniors to scan the quick response (QR) code, they were invited to answer our questions face-to-face with the assistance of our research collaborators.

In this study, the snowball sampling method was applied to collect data. Once some respondents completed the questionnaire, they were invited to recommend other participants who meet the research's target population requirements. Those who could not read or write were assisted by our research collaborators.
collaborators (through reading and ticking the items), during which the research collaborators made no suggestions, comments, or hints. The questionnaire was devoid of using sensitive language and required no information, such as the participants’ names to protect their privacy. Participants were told that their responses would be used for scientific research only, and they could quit and withdraw their data at any time. At the same time, ethical approval was obtained from the board member of the ethical committee of the first author’s institute. The questionnaire was available for data collection for two months. A total of 1,300 participants were invited with the assistance of research collaborators, and 997 responded (the response rate was 76.69%). After excluding invalid responses (i.e., missing data on crucial variables, response failed from attentional check, relatively short time frame for responses), there were 916 valid responses retained (Mage = 68.87, SD = 6.80, Age range = 60–96; see Table 1 for detailed info).

<table>
<thead>
<tr>
<th>Category</th>
<th>Options</th>
<th>Responses</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>478</td>
<td>52.20%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>438</td>
<td>47.80%</td>
</tr>
<tr>
<td>Age</td>
<td>60–65</td>
<td>372</td>
<td>40.60%</td>
</tr>
<tr>
<td></td>
<td>66–75</td>
<td>385</td>
<td>42.00%</td>
</tr>
<tr>
<td></td>
<td>≥ 76</td>
<td>159</td>
<td>17.40%</td>
</tr>
<tr>
<td>Family structure</td>
<td>Multigenerational families</td>
<td>351</td>
<td>38.30%</td>
</tr>
<tr>
<td></td>
<td>Live with spouse only</td>
<td>499</td>
<td>54.50%</td>
</tr>
<tr>
<td></td>
<td>Live alone</td>
<td>66</td>
<td>7.20%</td>
</tr>
<tr>
<td>Health status</td>
<td>Very unhealthy</td>
<td>8</td>
<td>0.90%</td>
</tr>
<tr>
<td></td>
<td>Unhealthy</td>
<td>57</td>
<td>6.20%</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>274</td>
<td>29.90%</td>
</tr>
<tr>
<td></td>
<td>Healthy</td>
<td>503</td>
<td>54.90%</td>
</tr>
<tr>
<td></td>
<td>Very healthy</td>
<td>74</td>
<td>8.10%</td>
</tr>
<tr>
<td>Educational degree</td>
<td>Primary school and below</td>
<td>285</td>
<td>31.10%</td>
</tr>
<tr>
<td></td>
<td>Junior middle school</td>
<td>299</td>
<td>32.60%</td>
</tr>
<tr>
<td></td>
<td>Senior high school</td>
<td>181</td>
<td>19.80%</td>
</tr>
<tr>
<td></td>
<td>Undergraduate</td>
<td>97</td>
<td>10.60%</td>
</tr>
<tr>
<td></td>
<td>Above bachelor</td>
<td>54</td>
<td>5.90%</td>
</tr>
</tbody>
</table>

Measures
Social network

We adopted a 9-item scale which originated from the 19-item Stroke Social Network Scale (SSNS) [64] to measure social network: network size (e.g., ‘I know more people in society than other elders in this community do’), network strength (e.g., ‘I keep in touch with my relatives, friends, and neighbors frequently’) and network heterogeneity (e.g., ‘People who keep in touch with me come from all walks of life’). All items were registered on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). For this sample, the Cronbach’s alpha of network size (\(\alpha = 0.71\)), network strength (\(\alpha = 0.62\)) and network heterogeneity (\(\alpha = 0.68\)) were all acceptable. Cronbach’s alpha regarding all items for the present sample was 0.80.

Information acquisition

A 6-item scale was adapted from Ferreras-Méndez and colleagues [65] to measure the degree of information acquisition of the elderly. It consisted of two dimensions, namely the breadth and depth of information acquisition [66, 67], with the former represented by the number of accesses or sources to information [68]. Specifically, the questionnaire measured the length of time spent by the elderly on various items through six common ways of information acquisition. The items were as follows, ‘How long do you chat online (by WeChat or QQ, etc.) every day?’; ‘How long do you talk on the phone every day?’; ‘How long do you spend reading online news every day?’; ‘How long do you spend reading newspapers every day?’; ‘How long do you spend watching TV every day?’ and ‘How long do you spend communicating with people face to face every day?’ Answers to each statement were based on a 5-Likert type scale ranging from 1 to 5 (1 represents none; 2 means less than 30 minutes; 3 stands for 30 minutes to 1 hour; 4 refers to 1 to 2 hours, and 5 signifies more than 2 hours).

As for the quantification of information acquisition, many studies have found the problem with “the more, the better.” For instance, team project collaboration, knowledge search in economics, and social information sharing in sociology [67, 69, 70, 71, 72], the idea of “the more, the better” in such walks of human life indicates that the count only by quantity ensures low credibility. Therefore, this study also uses the dimensions of information acquisition divided into depth and breadth to measure the effect (quantity and quality) of information acquisition. This helps obtain more reliable data to verify our assumptions. To this end, the breadth of information acquisition was obtained by calculating the number of statements participants responded to on each of the six common ways of information acquisition (1 represents few, 6 stands for very much). The depth of information acquisition was obtained by calculating the minutes and hours regarding each of the six common statements. Finally, the variable of information acquisition was obtained by calculating the mean value of the breadth and depth of information acquisition. Cronbach’s alpha regarding the present sample was 0.77.

Perceived community support

Support provided by the community to the elderly is aimed at raising the elderly’s awareness of and actions for positive coping with the COVID-19 pandemic. As a family, community, and society at large
may affect the perceptions and behaviors of community members or residents [46, 73], we referred to the Multidimensional Scale of Perceived Social Support (MSPSS) [74] and prior effort on a series of support provided to the community (i.e., providing body temperature monitoring services) [46], designed a 5-item scale measuring the elderly's perceived community support in COVID-19 (e.g., ‘My community has implemented strict measures to restrict people's in and out via checking each pass’ and ‘My community has popularized the knowledge of pandemic prevention and control of COVID-19 for its residents). Each item was registered based on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha of the present sample was 0.83.

Positive coping behavior

Combined with the Chinese government's response and suggestions to the public and the research on COVID-19 protective behavior [75, 76], the elderly's positive coping behavior was measured by a 5-item scale adapted from the 21-item Utrecht Proactive Coping Competence scale (UPCC) [77]. Sample items were ‘During the COVID-19 pandemic, I reduced unnecessary travel’ and ‘During the pandemic, I had regular ventilation at home’. The 5-point Likert-type scale was employed (ranging from 1 = strongly disagree to 5 = strongly agree) for responses, and Cronbach's alpha regarding the present sample was 0.84.

Data analytical strategy

First, the Kaiser-Meyer-Olkin coefficient (KMO ≥ 0.60) and Bartlett test (significance p < 0.001) were performed using SPSS (25.0) to determine whether the data was suitable for further confirmatory factor analysis (CFA) in AMOS (24.0) [78, 79]. Subsequently, the CFA within AMOS (24.0) was applied to test whether the measurement model fit our data [80]. The following indices were considered for evaluating the overall model fit: root-mean-square error of approximation (RMSEA ≤ 0.08 means acceptable fit, ≤ 0.05 indicates good fit) [81, 82], standardized root-mean-square-residual (SRMR ≤ 0.08 means acceptable; ≤ 0.05 indicates good fit) [83], comparative fit index (CFI ≥ 0.95 means good fit) [83, 84], normative fit index (NFI ≥ 0.90 indicates good fit), goodness-of-fit index (GFI ≥ 0.90), incremental fit index (IFI ≥ 0.90) and non-normed fit index (NNFI ≥ 0.90) [85, 86]. Finally, the chi-square/degrees of freedom ratio (χ²/df) was used, with a value below 3 being acceptable [87]. The structural equation modeling (SEM) approach was then utilized to test our proposed conceptual model in AMOS (24.0).

Results

Measurement model

The measurement model consisted of 6 latent variables (network size, network strength, network heterogeneity, information acquisition, perceived community support, and positive coping behavior) with 20 corresponding observed indicators. An initial test of the measurement model revealed satisfactory fit to the data: χ² = 432.65, χ²/df = 2.79; RMSEA = 0.04; SRMR = 0.04; CFI = 0.96; GFI = 0.96; TLI = 0.95. All factor loadings for the indicators on the latent variables were significant (p<0.001), indicating that all the
latent variables were well represented by their respective indicators. Means, standard deviations, and correlations between all tested variables are presented in Table 2. As indicated in Table 2, the positive coping behavior of the elderly was positively associated with network size, network strength, network heterogeneity, and perceived community support, while negatively associated with information acquisition, indicating that more information acquisition would associate with less positive coping behavior.

Table 2
Descriptive statistics and correlations between variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>PCB</th>
<th>NSI</th>
<th>NST</th>
<th>NH</th>
<th>PCS</th>
<th>IA</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCB</td>
<td>4.36</td>
<td>0.59</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSI</td>
<td>3.45</td>
<td>0.73</td>
<td></td>
<td>0.21**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NST</td>
<td>3.93</td>
<td>0.58</td>
<td>0.29**</td>
<td>0.44**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NH</td>
<td>3.55</td>
<td>0.72</td>
<td>0.23**</td>
<td>0.48**</td>
<td>0.39**</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCS</td>
<td>4.16</td>
<td>0.63</td>
<td>0.55**</td>
<td>0.26**</td>
<td>0.34**</td>
<td>0.22**</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>IA</td>
<td>3.20</td>
<td>0.88</td>
<td>-0.09*</td>
<td>0.23**</td>
<td>0.24**</td>
<td>0.24**</td>
<td>0.05</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note. PCB = positive coping behavior, NSI = network size, NST = network strength, NH = network heterogeneity, PCS = perceived community support, IA = information acquisition.

* p < 0.01, ** p < 0.001.

Structural model

The direct path coefficient from the predictors (network strength, network heterogeneity, and information acquisition) to the dependent variable (COVID-19 positive coping behavior of the elderly, $\beta = 0.21, p < 0.05; \beta = 0.16, p < 0.01; \beta = -0.12, p < 0.01$) in the absence of mediators was significant. However, the direct path coefficient from network size to positive coping behavior of the elderly was insignificant ($\beta = -0.10, p > 0.05$). A partial mediation model (Fig. 2) with a mediator and a direct path from social network and information acquisition to positive coping behavior of the elderly revealed a good fit to the data (Table 3).

A series of fit indices were used to evaluate the goodness-of-fit of the default model, as shown in Table 3. SRMR values for the hypothetical and adjusted models were below 0.05. RMSEA values for both models were 0.04 and 0.03, which were also below 0.05. The indices of GFI, IFI, NNFI, and CFI in these two models were above 0.90. Akaike information criterion (AIC, smaller values indicate a better fit of the model) [88] and expected cross-validation index (ECVI, a smaller value exhibits more significant potential for replication) [81] were additionally examined to compare the two models. The covariance between the two residual items was observed in the modification indices, and a correlation path was subsequently
added between the two residuals with the most significant covariance. This procedure was repeated until these values of the adjusted model were lower than the values of the saturated model. Taken together, the adjusted model fitted our data better.

In this study, it is worth pointing out that Mardia's (1970) coefficients for multivariate kurtosis (Mardia's kurtosis = 106.26) were above 5 (values > |5.00| indicative of non-normality) \[89, 90\]. Although maximum likelihood (ML) estimation is apparently robust to many violations of underlying assumptions \[91\], when data reveal evidence of multivariate kurtosis, interpretations based on the usual ML estimation may be problematic \[92\]. Due to the lack of multivariate normality, the Bollen-Stine bootstrap procedure (performed 5000 times) was used to correct fit statistic bias \[93\]. After Bollen-Stine bootstrapping correction, a set of the fitting indices indicated good model fit (\(\chi^2 = 176.52, df = 148, \chi^2/df = 1.19, RMSEA = 0.01, TLI = 0.99, GFI = 0.97, IFI = 0.996, CFI = 0.995\)).

Table 3

<table>
<thead>
<tr>
<th>Model</th>
<th>(\chi^2/df)</th>
<th>RMSEA</th>
<th>SRMR</th>
<th>TLI</th>
<th>GFI</th>
<th>IFI</th>
<th>CFI</th>
<th>AIC</th>
<th>ECVI</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesized model</td>
<td>2.79</td>
<td>0.04</td>
<td>0.04</td>
<td>0.95</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
<td>542.65</td>
<td>0.59</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Adjusted model</td>
<td>1.96</td>
<td>0.03</td>
<td>0.03</td>
<td>0.97</td>
<td>0.97</td>
<td>0.98</td>
<td>0.98</td>
<td>414.12</td>
<td>0.45</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Note. RMSEA = Root Mean Square Error of Approximation, SRMR = Standardized Root Mean Square Residual, GFI = Goodness-of-Fit Index, IFI = Incremental Fit Index, NNFI = Non-Normed Fit Index, CFI = Comparative Fit Index, AIC = Akaike Information Criterion, ECVI = Expected Cross-Validation Index.

Bootstrapping procedures were used to test the significance of the adjusted partial mediation model \[94, 95\], and the 95% confidence intervals (CI) for the standardized indirect effects were calculated with 5,000 bootstrapping techniques from the original data set (\(N= 916\)). As expected, the partial mediating effect of perceived community support within the relationship between network strength and positive coping behavior was significant (as shown in Table 4). However, the mediating effect of PCS within the relationship between network size and positive coping behavior, and the link between network heterogeneity and positive coping behavior was not significant (see Fig. 2).
Table 4
Standardized indirect effects and 95% confidence intervals

<table>
<thead>
<tr>
<th>Model pathways</th>
<th>Estimated</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>NSI→PCS→PCB</td>
<td>0.04</td>
<td>-0.06</td>
</tr>
<tr>
<td>NST→PCS→PCB</td>
<td>0.35</td>
<td>0.22</td>
</tr>
<tr>
<td>NH→PCS→PCB</td>
<td>0.03</td>
<td>-0.05</td>
</tr>
<tr>
<td>IA→PCS→PCB</td>
<td>-0.04</td>
<td>-0.07</td>
</tr>
</tbody>
</table>

Note. PCB = positive coping behavior, NSI = network size, NST = network strength, NH = network heterogeneity, PCS = perceived community support, IA = information acquisition. The empirical 95% confidence interval does not overlap with zero.

Discussion

This study explored factors predicting the positive coping behavior of the elderly via a new perspective by testing a proposed conceptual model in which social network, information acquisition, and perceived community support are considered significant in coping with the COVID-19 pandemic. Findings from a large sample of the Chinese elderly showed that social network (network strength and network heterogeneity) and information acquisition are directly associated with the COVID-19 positive coping behavior and indirectly through perceived community support. In general, results from the 916 Chinese elders supported our hypotheses, which contributed to a deeper understanding of the link between social network, information acquisition, and positive coping behavior in the context of the COVID-19 pandemic.

More specifically, our findings confirmed that social network plays a positive and significant role in the elderly’s COVID-19 positive coping behavior. Network strength was found to predict positive coping behavior directly and indirectly (through perceived community support). In other words, strong social ties could help the elderly respond more positively to turbulent challenges [96, 97]. This finding contradicted earlier studies that did not target the specific elderly group and suggested that weak ties promote positive behavior [98]. Also, though strong social relationships can provide people with greater support [99, 100], the present finding demonstrated that the expansion of the network size did not necessarily predict greater social support for the elderly, as it was challenging to ensure that the members of these networks are all able to provide effective support for the elderly [101]. This suggests that expanding social network by simply meeting more new people to increase the breadth may not impact much on positive coping behavior in the context of the COVID-19 pandemic; It is the depth of the social network that people bond together with an intense, well-connected relationship that counts [27]. Especially when they also have good relationship quality, there will be a significant impact on their well-being and positive outcomes [102]. Therefore, during the COVID-19 pandemic, it is necessary to keep in touch with and be strongly connected with family members, friends, and community members to make them feel safe and stay
happy via different social media for information [103]; Maintaining close contact while also improving the relationship quality [102] will effectively relieve the elderly’s anxiety, loneliness, and other negative emotions, and meet their spiritual needs to improve the knowledge and ability to use the psychological balance to deal with epidemic diseases [104].

Concerning network heterogeneity on positive coping behavior, in line with our expectations, the specific direct effect of social network heterogeneity on positive coping behavior was positive and significant among the elderly. This also favors the previously reported model of positive coping behavior [105, 106]. As high levels of network heterogeneity can promote people’s political participation and encourage people to adopt COVID-19 positive coping behavior, the highly heterogeneous social network can indeed provide the necessary diversified support for the elderly due to its diversity of people with a variety of age groups, professions, and education backgrounds, thus, making the elderly take advantage of more positive coping behavior in public health emergencies [107]. Therefore, further enriching the elderly’s social network relationships by developing different groups of social networks (network heterogeneity) is conducive to promoting their positive coping and, then, their physical and mental health and well-being [105].

Regarding the effect of information acquisition on the positive coping behavior of the elderly, our findings contradicted previous studies, which indicated that higher levels of information access could promote people’s positive coping behavior [108, 109]. One possible explanation might be that, for the elderly, a higher level of information acquisition does not guarantee a higher quality of information. Too much information or information load exposed to the elderly may bring about confusion. It is, therefore, possible that the overall quality of information, irrespective of the breadth or depth, can help the elderly, which is consistent with Irwin’s research on the impact of information accuracy on behavior [66, 110]. For instance, actively acquiring accurate information and knowledge about the COVID-19 pandemic help motivate the elderly to adopt positive coping behavior (i.e., social distancing, meeting avoidance, hand washing, and mask-wearing) [111].

Our results, by confirming prior works, revealed a partial mediation effect that the perceived community support played between network strength and positive coping behavior [112, 113]. This is consistent with the understanding of expanding the social network of the elderly to strengthen their resistance to changes [114, 115]. The elderly needs comprehensive, stable, and in-depth communication to maintain their health and well-being. As the primary carrier of social relations, the community where the elderly performs their daily activities should provide information access [116].

In addition, perceived community support partially mediated the link between information acquisition and positive coping behavior. In response to the call for research on personal information access during the global health crisis [117], this study explores the elderly who cannot obtain effective information through verification. A research pointed out that, although the elderly have different access to information from other groups [118], their perceived community support can be enhanced through the community resources which they can use to exchange information [119]. Meanwhile, despite the necessary
quarantine of residential communities, community workers can also provide timely help to the vulnerable elderly people to promote their perception of community support [120], thus encouraging their positive coping behavior [121].

This work has three contributions. First, the findings are based on a large population of 916 Chinese elderly aged between 60 and 96, which helps provide concrete evidence supporting the theoretical literature. Second, concurrent researches often focus on the direct impact of perceived community support on behavior while neglecting the underlying mechanisms [122, 123]. While this study applied the SEM to detect the contributing factors (social network, information acquisition, and perceived community support) that may predict positive coping behavior and to examine the underlying mechanism. Last but not least, the elderly, as a vulnerable population more susceptible to the COVID-19 pandemic threat, are less quickly and efficiently in terms of acquiring external information [2] and need more focus with great efforts to improve their ability to respond to actively and cope with such a pandemic crisis.

Unavoidably, this study has limits that warrant notice for future research. First, our sample source is restricted to Chengdu, a capital city in Southwest China. Therefore, future generalization work of the present findings may profit from exploring the elderly from other regions in China, other countries, and cultures. In addition, exploring the causal inference from such a cross-sectional survey data set is impossible. We are not sure if a bettered social network is beneficial for the elderly to take more positive and effective coping strategies, which in turn shows that those extroverts who like to accept changes from the outside world actively will inevitably have more diverse access to social information. Therefore, ongoing studies via experimental or longitudinal design to test its causal inference are appealing to address such a direction in future works. Third, our survey tools, though derived from literature scales with acceptable reliability and validity, underwent translation procedures, and misperceptions caused by cultural differences may have an impact on the results. Besides, it should be noted that positive coping behavior is predicted by various factors (e.g., personal, contextual, economic, educational, etc.) beyond the ones explored in the present work. Therefore, the SEM with more comprehensive indicators and qualitative comparative analysis for their combing effect on positive coping of the elderly is worth exploring in future work.

Conclusions

In the crisis of the COVID-19 pandemic, the elderly, whose immunity and reaction are weaker and slower than the other age groups, their health and well-being deserve more attention. However, scientific research and corresponding suggestions on how to help them cope positively with COVID-19 are emergently needed. Through the investigation of the 916 Chinese elderly, we found that the network strength and heterogeneity (instead of network size) of the social network, along with the information acquisition, significantly predicts positive coping behavior. Besides, perceived community support partially mediates the relationship between the elderly's social network (network strength and network heterogeneity) and positive coping behavior. Thus, theoretical guidance and practical concerns about helping the elderly cope with public health crises (i.e., COVID-19) are proposed.
Declarations

Ethics approval and consent to participate

This study followed the ethical policy of Southwest Jiaotong University (SWJTU) and with the 
Declaration of Helsinki (1964) and its later amendments or comparable ethical standards. Each 
participant was explained the research aims and asked to sign an informed consent before completing 
the study surveys.

Consent for publication

Not applicable.

Data availability statements

The datasets used and/or analyzed during the current study available from the corresponding author on 
reasonable request.

Competing interest

The authors declared no potential conflicts of interest concerning the design, authorship, and publication 
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Authors’ contributions

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Figures
Figure 1

The proposed conceptual model

Figure 2
The validated structural model.

Note. Factor loadings are standardized. Dotted lines represent non-significance while solid lines represent significant effect. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. 