

# Cyberchondria among college students and associated factors: a latent profile analysis

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1 **Cyberchondria Among College Students and Associated**  
2 **Factors: A Latent Profile Analysis**

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## 1 Abstract

2 **Purpose:** Online health research is highly prevalent among college students. Cyberchondria in  
3 this population often involves repeated health-related searches driven by anxiety, which can  
4 heighten distress and disrupt daily functioning. This study aims to explore the classes of  
5 cyberchondria among college students, and to identify the characteristics and associated factors.

6 **Methods:** In this online cross-sectional study, a total of 5641 students were recruited from a  
7 comprehensive university. Latent profile analysis (LPA) was performed to determine subgroups of  
8 cyberchondria. Multinomial logistic regression was used to analyze the influencing factors of  
9 different cyberchondria classes.

10 **Results:** Four classes of cyberchondria were identified: “Low-Variable Group”, “Moderate  
11 Seeking Group”, “Moderate Affective Group”, “High-Severe Group”. Logistic regression analysis  
12 indicated that students with poorer health status and higher eHealth literacy were more likely to be  
13 in the High-Severe group. Female students and those reporting poorer health had increased odds  
14 of falling into the Moderate Seeking and Moderate Affective groups.

15 **Conclusion:** Cyberchondria among college students showed clear categorical features. Female  
16 students, individuals with poorer self-reported health, and those with higher eHealth literacy are  
17 more prone to severe cyberchondria. Tailored interventions should be provided to address health  
18 anxiety and cyberchondria symptoms among college students.

19 **Keywords:** cyberchondria; latent profile analysis; college student; online health research; health  
20 anxiety

## 21 Introduction

22 As of 2022, the estimated number of Internet users worldwide was 5.3 billion, accounting for 66%

1 of the global population<sup>1</sup>. In China, the survey has revealed that approximately 71% of the  
2 respondents have searched for online health information<sup>2</sup>. As young people are among the most  
3 frequent and active Internet users, college students tend to obtain health information through  
4 online searches more than other groups<sup>3</sup>. Meng et al<sup>4</sup> reported that about half of college students  
5 preferred to use the Internet to find disease information when unwell, and more than 80% actively  
6 follow health information online. However, previous studies indicated that about 40% of subjects  
7 reported that online health research (OHR) increased their health anxiety<sup>5</sup>, and that college  
8 students with higher levels of health anxiety conducted OHR more frequently and for longer  
9 periods, further aggravating anxiety and distress<sup>6; 7</sup>.

10 The term “cyberchondria” has been used to describe the vicious cycle of increased  
11 anxiety due to OHR and subsequent continuing online search<sup>8</sup>. A review suggested that  
12 cyberchondria not only caused health anxiety in individuals but may also had a negative effect on  
13 interpersonal and social life<sup>9</sup>. Additionally, individuals with cyberchondria tend to visit doctors  
14 more frequently for reassurance, leading to unnecessary medical consultations and tests that  
15 contribute to the misuse of healthcare resources<sup>10</sup>. Thus, it is a priority to understand the specific  
16 patterns and factors that characterize different manifestations of this condition. Such knowledge is  
17 crucial for accurately identifying individuals at higher risk and developing targeted intervention  
18 strategies.

19 Early research predominantly relied on single indicators to measure cyberchondria<sup>11</sup>.  
20 Recognizing the multidimensional nature of this construct, McElroy and Shevlin developed the  
21 Cyberchondria Severity Scale (CSS), later refined into a validated four-dimension measure  
22 encompassing excessiveness (escalating/repeated nature of searches), compulsion (web searches

1 interfering with other aspects of on/offline life), distress (negative emotional response), and  
2 reassurance seeking (searches driving individuals to seek out professional medical advice)<sup>12; 13</sup>.  
3 These dimensions reflect distinct behavioral and emotional processes associated with OHR. For  
4 example, some individuals experience heightened distress during searching, whereas others  
5 primarily engage in reassurance-seeking behaviors<sup>14</sup>. Different combinations of these behavioral  
6 dimensions may reflect variations in individual's coping strategies in response to OHR. A mixed-  
7 methods study further indicated that significant differences in cyberchondria scores across these  
8 dimensions among college students<sup>15</sup>. Based on these findings, we hypothesize that cyberchondria  
9 may be heterogeneous within the college student population. However, empirical research  
10 exploring this heterogeneity remains limited. Current studies on cyberchondria primarily rely on  
11 total-score descriptions, emphasizing the overall severity of an individual's cyberchondria<sup>16; 17</sup>.  
12 Furthermore, a systematic review has noted substantial inconsistency in defining cutoff values for  
13 meaningful levels of cyberchondria<sup>18</sup>, underscoring the need for methods that can identify  
14 occurring subgroups.

15       Latent Profile Analysis (LPA) offers a person-centered approach that classifies  
16 individuals into subgroups based on their response patterns across multiple dimensions<sup>19</sup>. LPA  
17 enables a more comprehensive understanding of heterogeneity in cyberchondria by identifying  
18 distinct latent profiles<sup>19</sup>. Importantly, identifying these profiles has direct clinical and practical  
19 relevance: individuals dominated by distress may require mindfulness-based interventions,  
20 whereas those with elevated reassurance seeking may benefit from cognitive-behavioral  
21 psychological interventions<sup>18</sup>. Thus, LPA provides a conceptual and methodological foundation  
22 for developing precision-oriented interventions tailored to the needs of different subgroups.

1 Previous studies have suggested that demographic and situational factors, such as age,  
2 sex, education level, income, and health status<sup>16; 20</sup>, may be associated with cyberchondria,  
3 although findings remain inconsistent across studies<sup>21; 22</sup>. The Integrative Model of eHealth Use  
4 (IMeHU) posits that individuals' OHR and related psychological responses are shaped by  
5 demographic characteristics, situational factors (e.g., health status), eHealth literacy, and history  
6 of Internet use<sup>23</sup>. eHealth literacy is commonly defined as "the ability to seek, find, understand,  
7 and appraise health information from electronic sources and apply the knowledge gained to  
8 addressing or solving a health problem"<sup>24</sup>. According to the IMeHU, eHealth literacy serves both  
9 as a reflection of an individual's motivation and ability to conduct OHR and as one of its  
10 influencing factors<sup>23</sup>. Kalantari et al. further demonstrated that eHealth literacy was correlated  
11 with certain dimensions of cyberchondria but not with the overall construct, suggesting that its  
12 influence differs across specific symptom components<sup>17</sup>. This finding highlights the  
13 multidimensional and potentially heterogeneous nature of cyberchondria. Guided by this  
14 framework, we focused on demographic variables, health status, and eHealth literacy that are  
15 particularly relevant to college students and are linked to variations in how individuals respond to  
16 online health information.

17 Therefore, this study aims to (1) identify latent profiles of cyberchondria among college  
18 students using LPA and describe the characteristics of each profile; and (2) determine key factors  
19 associated with different cyberchondria profiles.

## 1 **Material and methods**

### 2 *Participants and Procedure*

3 This was a cross-sectional observational study conducted at a comprehensive university in  
4 Changsha, Hunan Province, China. The university, one of China's leading universities, offers  
5 bachelor's degree programs in 106 majors and has over 50,000 full-time students. We explained  
6 the research background, purpose, anonymity and confidentiality rules, and additional notes to the  
7 college students on-site from June 10 to 15, 2021. They were then invited to fill out an online  
8 questionnaire using WeChat to scan the QR code on the papers. The inclusion criteria were as  
9 follows: (a) college students over 18 years of age; (b) Chinese students from the target university.  
10 The exclusion criterion was students who had never engaged in online health information  
11 searching, as determined by a screening question ("Have you ever searched for health-related  
12 information online?"). Individuals who answered "no" to this item were excluded.

13 The following three methods were used to improve data quality: 1) the online platform  
14 limited each ID to a single completion to avoid duplicate responses; 2) all items were mandatory  
15 before submission to prevent missing data; 3) responses completed in less than 90 seconds were  
16 considered invalid. A total of 6283 respondents responded to this survey, of which 641 were not  
17 conformed to the time prerequisite and 1 was younger than 18 years old who did not meet the  
18 inclusion criteria. The final number of valid responses was 5641, with an effective rate of 89.8%.

### 19 *Measures*

#### 20 **Sociodemographic Characteristics**

21 The sociodemographic information included gender, age, major, education level and health status.

1 Health status was self-reported based on the options of “Very good”, “Pretty good”, “in General  
2 level”, “Pretty poor” and “Very poor”.

### 3 **Cyberchondria**

4 The Short-Form Version of the Cyberchondria Severity Scale (CSS-12) developed by McElroy et  
5 al<sup>13</sup> was used to assess the severity of cyberchondria among college students. The CSS-12 has 12  
6 items in four dimensions: excessiveness (items 1, 3, and 6), distress (items 4, 8, and 9),  
7 reassurance (items 5, 11, and 12) and compulsion (items 2, 7, and 10). The Likert 5-point scale  
8 ranging from 1 (never) to 5 (always) was used, with higher scores indicating a more serious  
9 cyberchondria of college students. The Chinese version of CSS-12 was translated and revised by  
10 Jin et al<sup>25</sup>. The Chinese version of CSS-12 has demonstrated good reliability (Cronbach's  $\alpha=0.92$ )  
11 and construct validity ( $\chi^2/df=2.86$ , GFI = 0.95, CFI = 0.97, TLI = 0.96, IFI = 0.97, RMSEA =  
12 0.07)<sup>25</sup>. In this study, the Cronbach's  $\alpha$  coefficient for the CSS-12 was 0.908.

### 13 **eHealth Literacy**

14 The eHealth Literacy Scale (eHEALS) developed by Norman et al<sup>24</sup> was used to measure the  
15 level of eHealth literacy among college students. The eHEALS consists of eight items, measuring  
16 ability to utilizing online health information and services (items 1, 2, 3, 4, and 5), judgment ability  
17 (items 6 and 7), and decision-making ability (item 8). On a five-point scale, responses range from  
18 strongly disagree (1 point) to strongly agree (5 points). The higher the score, the higher the level  
19 of eHealth literacy is. The Chinese version of eHEALS was translated and revised by Guo et al<sup>26</sup>.  
20 The scale has demonstrated good reliability (Cronbach's  $\alpha=0.913$ ) and construct validity (with an  
21 eigenvalue of 4.990, item factor loadings ranging from 0.692-0.869 and the cumulative variance

1 contribution rate of 62.38%)<sup>26</sup>. In this study, the Cronbach's  $\alpha$  coefficient for the eHEALS was  
2 0.963.

### 3 ***Ethical clearance***

4 This study was approved by the Institutional Review Board of the Third Xiangya Hospital, Central  
5 South University (No: I 21071). All study procedures were conducted in accordance with the  
6 Declaration of Helsinki and relevant guidelines and regulations. All investigators received training  
7 on questionnaire administration procedures and key precautions. The purpose of the study was  
8 explained to participants in advance, and strict confidentiality was maintained for all collected  
9 personal information. Participants signed an electronic informed consent form before completing  
10 the questionnaire.

### 11 ***Statistical Analysis***

12 The statistical software SPSS 26.0 and Mplus 8.3 were used for data analysis. Categorical  
13 variables were described by frequency and percentage. The eHealth literacy score was positively  
14 skewed (skewness = -0.979, kurtosis = 1.252) and was therefore described using median and  
15 quartiles. The cyberchondria severity score was determined to follow a normal distribution based  
16 on skewness  $<|1|$  and kurtosis  $<|1|$ ; hence, the mean  $\pm$  standard deviation (SD) was used to  
17 describe it. Then four dimensions of the CSS-12 were used as observed variables for latent profile  
18 analysis (LPA) by Mplus 8.3. The Akaike information criterion (AIC), Bayesian information  
19 criterion (BIC), and Sample size adjust BIC (aBIC) were used to judge the model fit, with smaller  
20 values representing a better fit. The closer the entropy is to 1, the more accurate the classification  
21 is. The Lo-Mendell-Rubin likelihood ratio test (LMR) and Bootstrapped likelihood ratio test

1 (BLRT) were used to compare model fit differences, with  $P < 0.05$  indicating that class  $k$  provided  
2 a better fit than class  $k-1$ . Finally, based on the best classification model determined by LPA, the  
3 three-step approach suggested by Vermunt<sup>27</sup> was used for multinomial logistic regression, which  
4 takes into account classification error or uncertainty in the second step, and the difference is  
5 considered statistically significant at  $P < 0.05$ .

## 6 **Results**

### 7 *Sociodemographic Characteristics*

8 Among the 5641 college students, approximately three-fifths were male (3329/59.0%); the  
9 average age was  $21.39 \pm 2.75$  years. The majority were Han Chinese (5118/90.7%) and non-  
10 medical students (5408/95.9%). Nearly three-quarters were undergraduates (4124/73.1%) and a  
11 minority (461/8.2%) were in general level, pretty poor or very poor health status. More details are  
12 shown in Table 1.

### 13 *Common Method Bias Test*

14 The Harman's single-factor test was used. The results showed that four factors with eigenroots  
15 greater than 1 were obtained without rotation, and the amount of variance explained by the first  
16 factor was 35.08% ( $< 40\%$ ). This shows that common method variance did not affect the results of  
17 this study too much.

### 18 *eHealth Literacy and Cyberchondria of College Students*

19 The median eHealth literacy score was 32.00 (8). The average scores of cyberchondria was  
20  $33.05 \pm 8.71$ , and the mean scores of each dimension were as follows:  $7.91 \pm 2.78$  (the excessiveness

1 dimension),  $9.18 \pm 2.48$  (the distress dimension) and  $8.34 \pm 2.53$  (the reassurance dimension),  
2  $7.62 \pm 2.54$  (the compulsion dimension).

### 3 ***Latent Profile Analysis of Cyberchondria in College Students***

4 Based on the four-dimension scores of CSS-12 for LPA, the latent profile models for classes 1 to 6  
5 were obtained by stepwise fitting, as shown in Table 2. As the number of classes increases, the  
6 AIC, BIC, and aBIC values were decreasing gradually, and the entropy was highest in 6-profile  
7 model. The p-values of LMR and BLRT for the fitted models were  $<0.05$ . However, the 5-, 6-  
8 profile model have profiles with less than 5% of the population. Therefore, the 5-, 6-profile model  
9 was excluded and the 4-profile model was optimal. The results also showed that the average  
10 probability of subjects in the 4 classes belonging to each latent profile ranged from 89.4% to  
11 94.0%, indicating the reliability of the 4-profile model.

### 12 ***Naming of Latent Profile***

13 As shown in Figure 1, the latent profiles demonstrated distinct patterns across the cyberchondria  
14 dimensions. Profile 1 showed the lowest scores with noticeable fluctuations across dimensions,  
15 and was therefore labeled “Low-Variable”. Profile 2 presented elevated distress and excessiveness  
16 with comparatively moderate reassurance-seeking and compulsion. This pattern reflects an  
17 inward, emotion-driven response to health information, and it was therefore labeled “Moderate  
18 Affective”. Profile 3 displayed relatively higher excessiveness and reassurance compared with  
19 distress and compulsion, indicating an outward, reassurance-seeking behavioral tendency. This  
20 group was thus labeled “Moderate Seeking”. Profile 4 displayed uniformly high scores across all  
21 four dimensions, indicating a pervasive and severe manifestation of cyberchondria. This group

1 was therefore labeled “High-Severe”. The percentages of profiles 1-4 were 10.6% (598), 38.5%  
2 (2170), 40.2% (2265), and 10.8% (608), respectively.

### 3 ***Multinomial Logistic Regression of Cyberchondria Among College*** 4 ***Students***

5 A multinomial logistic regression analysis was conducted using the latent profile of cyberchondria  
6 as the dependent variable (“Low-Variable Group” as the reference) and the statistically significant  
7 factors in the univariate analysis as the independent variables. Compared with Low-Variable  
8 Group of cyberchondria, college students with relatively poor health and high eHealth literacy  
9 scores were more likely to be in High-Severe Group. The likelihood of being in the Moderate  
10 Seeking Group and Moderate Affective Group was higher for college students who were female  
11 and in relatively poor health. More details are shown in Table 3.

## 12 **Discussion**

13 To our knowledge, this is the first study to explore the class of cyberchondria among college  
14 students using the LPA. Our findings identified four subgroups and related factors in college  
15 students that will help educational administrators and healthcare providers better understand the  
16 heterogeneous clustering classification characteristics of college students with cyberchondria and  
17 develop more targeted interventions.

### 18 ***Different Profiles of Cyberchondria Among College Students***

19 Four latent profiles of cyberchondria were identified among college students: “Low-Variable”,  
20 “Moderate Affective”, “Moderate Seeking”, and “High-Severe”. A previous similar study by  
21 Liang et al.<sup>28</sup> explored the heterogeneity of cyberchondria among nursing students, identifying

1 three profiles. The discrepancy with the present findings may be attributable to methodological  
2 differences (the use of item-level LPA) and the participants' medical education background,  
3 which may shape their health-information processing patterns.

4         Only 10.6% of students were classified into the Low-Variable Group of cyberchondria,  
5 with a CSS-12 score of  $(19.17\pm 3.69)$ . Although their overall level of cyberchondria was low,  
6 scores varied considerably across dimensions. Specifically, excessiveness and reassurance were  
7 notably higher than distress and compulsion. This suggests that individuals in this group tend to  
8 engage in repeated OHR and subsequently seek reassurance from healthcare professionals, but  
9 experience minimal emotional disturbance or disruption to daily functioning. One possible  
10 explanation is that medical consultation effectively reduces their uncertainty and alleviates  
11 anxiety. Eichenberg et al.<sup>29</sup> likewise reported that interaction with medical professionals was  
12 effective in relieving symptoms in people with cyberchondria following exposure to online health  
13 information. The 10.8% of college students belonged to the High-Severe Group of cyberchondria,  
14 with a CSS-12 score of  $(49.22\pm 4.89)$ , characterized by consistently elevated scores across all  
15 dimensions. Fergus et al.<sup>30</sup> proposed that severe cyberchondria can be understood within a  
16 metacognitive framework associated with affective disorders: maladaptive beliefs about health  
17 lead to escalating worry, repeated checking, and persistent negative emotional cycles.  
18 Mindfulness-based cognitive therapy can effectively interrupt this reinforcing loop and reduce  
19 anxiety, suggesting potential avenues for intervention in this high-risk group<sup>31</sup>. The majority of  
20 college students were Moderate Seeking Group (40.2%) and Moderate Affective Group (38.5%)  
21 of cyberchondria, with CSS-12 scores of  $(28.41\pm 3.16)$  and  $(37.18\pm 3.24)$ , respectively. The  
22 Moderate Affective Group exhibited elevated excessiveness and distress, with a relatively flat

1 pattern across dimensions, indicating prominent emotional reactivity to online health information.  
2 Interventions for this group may benefit from psychological approaches, such as mindfulness or  
3 emotion-regulation training, to address distress directly. The Moderate Seeking Group  
4 demonstrated the higher excessiveness scores but the lower compulsion scores, suggesting  
5 frequent and repetitive online health searches that do not substantially interfere with daily  
6 functioning. For this subgroup, cognitive–behavioral strategies may be effective in helping  
7 individuals recognize the negative consequences of excessive online health searches and develop  
8 healthier information-seeking habits<sup>18</sup>.

### 9 ***Factors Affecting Cyberchondria Among College Students***

10 The results showed that the better self-reported health status was associated with lower levels of  
11 cyberchondria among college students, which was similar to the results in previous studies. Xu et  
12 al.<sup>32</sup> discovered through a qualitative study that cyberchondriac individuals tend to perceive  
13 themselves as having poor health and were often anxious as a result. Infanti et al.<sup>22</sup> also revealed a  
14 negative association between self-rated health status and cyberchondria and each dimension,  
15 suggesting that those who evaluate their health more poorly experience greater symptom-related  
16 worry. However, other studies have reported no significant relationship between self-reported  
17 health and cyberchondria<sup>16; 33</sup>. This discrepancy may be due to variations in how self-reported  
18 health status is measured; therefore, future research should adopt more objective health  
19 assessments to clarify its true impact on cyberchondria. Additionally, our findings suggested that  
20 gender played an important role. Female students were more likely to fall into moderate levels of  
21 cyberchondria, highlighting the need for gender-sensitive interventions. Tailored mental health  
22 programs that address emotion regulation, coping skills, and information-seeking behaviors may

1 help reduce cyberchondria vulnerability among female college students.

2           The results indicated that eHealth literacy was a significant predictor of High-Severe  
3 Group of cyberchondria ( $P \leq 0.05$ ), with each unit increase in eHealth literacy associated with a  
4 7.5% higher likelihood of belonging to this group. In line with the present study, Zhu et al<sup>34</sup> found  
5 that students with higher levels of eHealth literacy were vulnerable to cyberchondria. Lokajova et  
6 al<sup>35</sup> also found that adolescents with higher self-perceived eHealth literacy engaged in more OHR  
7 and experienced greater health anxiety. Theoretically, individuals with higher eHealth literacy  
8 should be better at searching for and understanding health information online than those with  
9 lower eHealth literacy<sup>23</sup>. Zheng et al<sup>36</sup> confirmed that adults (mean age 39.47 years) with higher  
10 eHealth literacy were less likely to develop cyberchondria. Several factors may account for these  
11 discrepancies. First, self-perceived eHealth literacy may not accurately reflect actual competence,  
12 particularly among younger individuals who tend to overestimate their abilities<sup>37</sup>. Second,  
13 individuals with higher eHealth literacy also tend to engage in more frequent and extensive online  
14 information seeking. This increased exposure can itself elevate the risk of encountering  
15 ambiguous or alarming information, thereby amplifying health-related anxiety. Third, higher  
16 levels of disease-related knowledge among highly educated groups, such as college students, may  
17 heighten sensitivity to bodily sensations or symptom interpretations, making them more reactive  
18 to online health content. Therefore, the relationship between eHealth literacy and cyberchondria is  
19 likely multifaceted rather than linear. These findings underscore the need for targeted  
20 interventions that address not only the enhancement of eHealth literacy but also the development  
21 of critical appraisal skills, balanced information-seeking habits, and effective coping strategies.  
22 Future research should further examine the complex mechanisms linking self-perceived and actual

1 eHealth literacy to cyberchondria, paying particular attention to potential moderating effects of  
2 age, information-seeking patterns, psychological factors, and the accuracy of self-assessment.  
3 Moreover, with the rapid expansion of artificial intelligence (AI) tools (e.g., ChatGPT),  
4 individuals increasingly turn to AI for symptom interpretation, health advice, and even informal  
5 self-diagnosis<sup>38</sup>. This emerging behavior may fundamentally reshape the pathways through which  
6 online health information affects anxiety and reassurance-seeking. Future studies can therefore  
7 examine further how reliance on AI-generated health information influences cyberchondria,  
8 whether AI use amplifies or alleviates uncertainty, and how users' patterns of engagement with AI  
9 tools shape cyberchondria-related behaviors.

## 10 **Limitations**

11 There are several limitations. First, we selected college students from only one university.  
12 Although the university enrolls students from across the country, the investigated population is  
13 likely to have a higher academic performance, which may limit the generalizability of the  
14 findings. Second, participants who had never searched for health information online were  
15 excluded. While this decision aligned with the study's focus on online health-related behaviors, it  
16 may have inadvertently removed a subset of individuals with better health status, thereby  
17 introducing selection bias. Third, health status was assessed through self-report without validated  
18 criteria, which may have resulted in potential reporting bias. Fourth, responses related to  
19 cyberchondria may have been influenced by social desirability, as participants might have been  
20 reluctant to disclose psychological distress. Additionally, because the survey design required  
21 respondents to complete all items before submission, participants who were uncomfortable with  
22 certain questions may have withdrawn from the survey, potentially generating further response

1 bias. Finally, the cross-sectional design did not allow examination of temporal changes in  
 2 cyberchondria profiles or causal relationships among variables.

### 3 **Conclusion**

4 The present study identified four distinct profiles of cyberchondria among college students,  
 5 offering a more nuanced characterization of its heterogeneity. Better subjective health status was  
 6 linked to lower levels of cyberchondria, whereas higher eHealth literacy unexpectedly predicted a  
 7 greater likelihood of belonging to the High-Severe group. These findings highlight the need for  
 8 targeted intervention strategies, including programs that strengthen critical appraisal of online  
 9 health information, promote balanced information-seeking behaviors, and cultivate effective  
 10 coping skills. Future research should incorporate objective health indicators and further elucidate  
 11 the mechanisms through which self-perceived and actual eHealth literacy influence cyberchondria,  
 12 particularly in the context of emerging AI-driven health information sources.

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## 30 Author contributions

31 Ziqiang Yao: Conceptualization; methodology; formal analysis; writing—original draft; writing—  
32 review and editing. Ning Qin: Investigation; formal analysis; writing original draft; writing—review  
33 and editing. Shuangjiao Shi: Conceptualization; formal analysis; writing—review and editing. Xiao  
34 Li: Investigation; writing—review and editing; formal analysis. Zhuqing Zhong: Conceptualization;

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## 5 **Data Availability**

6 The data sets generated and analyzed during this study are available from the corresponding author

7 upon reasonable request.

## 8 **Declarations**

## 9 **Competing interests**

10 The authors declare they have no financial interests.

## 11 **Figure legend**

12 Fig. 1 Latent profiles of cyberchondria among college students

13 **Table 1** Sociodemographic characteristics of college students (N = 5641).

| Variables | n (%)      |
|-----------|------------|
| Gender    |            |
| Male      | 3329(59.0) |
| Female    | 2312(41.0) |
| Age       |            |
| 18-21     | 2507(44.4) |
| 21-24     | 2071(36.7) |

|  |             |
|--|-------------|
| ≥24                                      | 1063(18.8)  |
| Ethnicity                                |             |
| Han Chinese                              | 5118 (90.7) |
| Ethnic Minority                          | 523(9.3)    |
| Major                                    |             |
| Medical                                  | 233(4.1)    |
| Non-medical                              | 5408(95.9)  |
| Educational level                        |             |
| Undergraduate                            | 4124(73.1)  |
| Post-graduate                            | 1220(21.6)  |
| PhD                                      | 297(5.3)    |
| Health status                            |             |
| Very good                                | 2530(44.9)  |
| Pretty good                              | 2650(47.0)  |
| In general level, pretty poor, very poor | 461(8.2)    |

1 **Table 2** Indicators for each latent profile of cyberchondria in college students (N = 5641)

| Profile | k  | likelihood | AIC        | BIC        | aBIC       | Entropy | P value |        |                    |
|---------|----|------------|------------|------------|------------|---------|---------|--------|--------------------|
|         |    |            |            |            |            |         | LMR     | BLRT   | Proportion         |
| 1       | 8  | -53391.866 | 106799.732 | 106852.834 | 106827.412 | -       | -       | -      | -                  |
| 2       | 13 | -50167.189 | 100360.378 | 100446.669 | 100405.359 | 0.765   | 0.0000  | 0.0000 | 0.58/0.42          |
| 3       | 18 | -48481.933 | 96999.865  | 97119.346  | 97062.147  | 0.827   | 0.0000  | 0.0000 | 0.36/0.13/0.51     |
| 4       | 23 | -47810.674 | 95667.349  | 95820.019  | 95746.932  | 0.833   | 0.0000  | 0.0000 | 0.11/0.38/0.40/0.1 |

|   |    |            |           |           |           |       |        |        |                    |
|---|----|------------|-----------|-----------|-----------|-------|--------|--------|--------------------|
|   |    |            |           |           |           |       |        |        | 1                  |
| 5 | 28 | -47352.334 | 94760.668 | 94946.526 | 94857.551 | 0.853 | 0.0000 | 0.0000 | 0.11/0.37/0.13/0.0 |
|   |    |            |           |           |           |       |        |        | 2/0.37             |
| 6 | 33 | -47163.552 | 94393.104 | 94612.152 | 94507.288 | 0.855 | 0.0002 | 0.0000 | 0.03/0.10/0.35/0.3 |
|   |    |            |           |           |           |       |        |        | 7/0.13/0.02        |

1 **Abbreviations:** k = free parameters; AIC = Akaike information criterion; BIC = Bayesian  
2 information criterion; aBIC = Sample size adjusted BIC; LMR = Lo-Mendell-Rubin likelihood ratio  
3 test; BLRT: Bootstrapped likelihood ratio test.

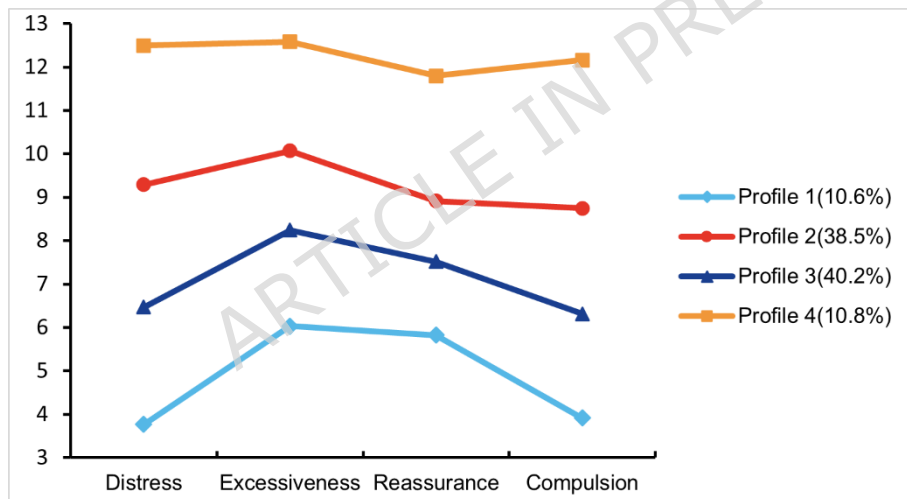
4 **Table 3** Multinomial logistic regression of cyberchondria (N=5641)

| Variables                      | Moderate Seeking |             | Moderate Affective <sup>a</sup> |             | High-Severe <sup>a</sup> |             |
|--------------------------------|------------------|-------------|---------------------------------|-------------|--------------------------|-------------|
|                                | OR               | 95%CI       | OR                              | 95%CI       | OR                       | 95%CI       |
| Gender <sup>b</sup>            | 0.644***         | 0.509-0.816 | 0.635***                        | 0.508-0.795 | 0.770                    | 0.587-1.011 |
| Age                            | 1.012            | 0.949-1.080 | 1.055                           | 0.993-1.120 | 1.057                    | 0.974-1.146 |
| Ethnicity <sup>c</sup>         | 1.143            | 0.789-1.655 | 1.024                           | 0.724-1.448 | 1.039                    | 0.678-1.593 |
| Major <sup>d</sup>             | 0.758            | 0.455-1.262 | 0.775                           | 0.478-1.255 | 0.839                    | 0.463-1.523 |
| Educational level <sup>e</sup> |                  |             |                                 |             |                          |             |
| Post-graduate                  | 1.423            | 0.961-2.107 | 1.305                           | 0.903-1.888 | 1.322                    | 0.834-2.097 |
| PhD                            | 1.033            | 0.496-2.149 | 0.931                           | 0.472-1.837 | 0.672                    | 0.280-1.613 |
| Health status <sup>f</sup>     |                  |             |                                 |             |                          |             |
| Very good                      | 0.613*           | 0.378-0.993 | 0.426***                        | 0.273-0.666 | 0.357***                 | 0.209-0.610 |
| Pretty good                    | 1.136            | 0.697-1.852 | 0.816                           | 0.519-1.284 | 0.698                    | 0.409-1.191 |
| eHealth literacy               | 0.983            | 0.963-1.003 | 0.984                           | 0.966-1.002 | 1.075***                 | 1.047-1.105 |

1 **Notes:** <sup>a</sup> Reference: Low-Variable Group; <sup>b</sup> Gender (0=female, 1=male); <sup>c</sup> Ethnicity (0=ethnic  
 2 minority, 1=Han Chinese); <sup>d</sup> Major (0=non-medical, 1=medical); <sup>e</sup> Educational level  
 3 (0=undergraduate); <sup>f</sup> Health status (0=in general level, pretty poor, very poor); \* $P \leq 0.05$ , \*\* $P \leq 0.01$ ,  
 4 \*\*\* $P \leq 0.001$

5 **Abbreviations:** OR, odds ratio; 95%CI, 95% confidence interval for regression coefficient.

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