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ORIGINAL RESEARCH

The Moderating Role of Health Literacy and Health Promoting Behavior in the Relationship Among Health Anxiety, Emotional Regulation, and Cyberchondria

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Background: People are increasingly turning to the internet to find answers to their health concerns in an era where there is a wealth of online health information, which frequently causes increased health anxiety and the phenomenon known as cyberchondria. The objectives of this study were to examine the moderating role of health literacy and health promotion behavior and the mediating role of emotional regulation between health anxiety and cyberchondria among the Pakistani population.

Methods: The study used a self-administered questionnaire to collect and examine health anxiety, emotional regulation, health literacy, health promotion behavior, and cyberchondria in 755 residents. A moderated mediation model of Hayes PROCESS was used to examine this hypothesis.

Results: The findings unveiled the average score of the participants on the study variables, as well as their categorization into low, moderate, and high categories. On scale of Health Anxiety participant scores (32% vs 53% vs 15%), Emotional Regulation (25% vs 46% vs 29%), Cyberchondria (18% vs 41% vs 41%), Health Literacy (56% vs 29% vs 15%), and Health promotion Behavior (49% vs 28% vs 23%). Moreover, result revealed that emotional regulation mediates the significant positive association between health anxiety and cyberchondria (β=0.25**p<0.001). Furthermore, health literacy moderates the negative association health anxiety and emotional regulation (β=−0.42*p<0.031), and health promotion behavior also negatively moderate the relationship between emotional regulation and cyberchondria (β=−0.27*p<0.22).

Conclusion: Based on the findings, it is recommended that health policymakers consider comprehensive national initiatives that focus on educational planning. These initiatives should boost health literacy levels and promote health-related behavior. Additionally, there is urgent need for strict measures to be put in place for monitoring online platforms and websites that spread inaccurate or false health-related information.

Keywords: cyberchondria, health literacy, health promoting behavior, health anxiety, emotional regulation

Introduction

There has been a notable rise in the proportion of adult individuals who utilize the internet to search for health-related information. Increasing numbers of people rely on the internet as their primary source of health-related information today.[1] Individuals augment medical diagnoses with self-diagnoses based on online information.[2] Using the internet to obtain health information can increase health awareness, but there are hazards involved.[3] Excessive searching for health information online can cause stress and anxiety.[4] This phenomenon is commonly referred to as "cyberchondria" and it is characterized by severe health problems associated with obsessive-compulsive behaviors and excessive internet use.[5] According to a global survey, between 40% and 80% of internet consumers have sought health information online.[6] It is worth noting that not all cases of looking for information about one's symptoms necessarily signify the presence of cyberchondria. It is natural for people to be concerned about their health. The issue arises when an excessive amount of disease-related worry and information-seeking

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disrupt daily functioning.[7] According to Doherty-Torstrick et al,[8] cyberchondria—an excessive search on the internet for medical conditions and symptoms—increases severe health anxiety and has the potential to develop into a dispositional trait.[9] There are two aspects to cyberchondria, according to McElroy et al[3] the behavioral aspect, which deals with how people look up information about diseases and attempt to calm themselves, and the emotional aspect, which deals with the fear or anxiety that results from searching and the inability to control one's behavior.

It is undeniable that a person's health has a substantial impact on his or her overall quality of life.[10] As a result, even those individuals who are currently in good health often maintain concerns regarding both their physical and mental health.[11] Health anxiety occurs when this fear becomes excessive and remains despite reassurance from medical specialists that there is no reason to panic.[12] Health anxiety is defined as an excessive fear of acquiring a serious illness.[13] Misdiagnosis can occur when people misinterpret minor or common physical or mental signs for significant illness symptoms. Anxious people worry more about their health and give greater attention to health-related news and recommendations.[14] Numerous studies have revealed that cyberchondria is associated with health anxiety.[15–17] Many people search information on internet on diseases and accessible therapies because they are afraid of becoming ill. Excessive internet use for self-diagnosis does not ease anxiety and may even exacerbate it.[18,19]

Thinking and feeling in a certain way are associated with unpleasant emotional states such as fear and worry. Elevated health anxiety is predominantly the outcome of negative thought pattern and dysfunctional attitudes regarding health and disease.[20] Because of their automaticity and consistency, these patterns might be difficult to notice and manage.[21] This challenge may assist in explaining why people suffering from health anxiety seek so much information about potential health dangers in online discussion forums. When a person's mental patterns become distorted, they selectively seek out and interpret health-related information, aggravating their concern. The emotions experienced at the moment can selectively influence and distort perception, either boosting optimism or intensifying a sense of fear.[22]

According to Garnefski and Kraaij, "emotional regulation" refers to the process of attempting to alter one's emotional state by inducing or extending emotional experiences or by modifying their frequency, intensity, or duration.[23] To achieve one's goals, emotional regulation must be adaptable. This requires awareness and understanding of one's emotions, acceptance of those emotions, impulse control, persistence in the face of unpleasant emotions, and the implementation of appropriate emotional regulation techniques.[24] Moreover, Jungmann and Witthoft[25] examined that emotional regulation was an indirect protective factor against health anxiety and cyberchondria. However, issues with emotional regulation are linked to a variety of functional deficits, such as a tendency toward digital addiction.[26] According to Bottesi et al, cyberchondria is closely associated with problematic internet use, which is enabled by emotional regulation and impulse control issues.[27] Researchers have demonstrated a correlation between poor emotional regulation techniques such as ruminating, catastrophizing, health anxiety, and cyberchondria.[17,27] Regularly searching online for medical information about one's disease can provide transient relief from repetitive thoughts and unpleasant feelings.[17]

Health literacy is defined as the social and cognitive abilities that influence people's motivation and ability to obtain, comprehend, and employ health-related information.[28] Despite the fact that the World Health Organization (WHO) has recognized health literacy as a crucial factor in determining health,[29] a number of studies have disclosed a lack of health literacy in various populations; as Mohammadi et al that examined the subject's contributing factors in health literacy, Iran has a low level of health literacy.[30] Similarly, studies conducted in multiple European nations on health literacy levels revealed that over 50% of adults lacked adequate health literacy, hindering their ability to take care of their health properly.[31] The investigation by Diviani et al[32] into the relationship between information assessment skills and health literacy revealed that individuals with low health literacy have difficulty assessing information, determining its reliability, and placing trust in it.

A high level of health literacy is required for making informed health decisions. Low health literacy can lead to an individual's incapacity to care for himself, increased dependency on emergency services, delayed diagnosis of an illness, increased disease prevalence, and increased mortality rate.[33] Furthermore, when compared to people with high health literacy, those with low health literacy are hospitalized more frequently and for longer periods of time.[34] Insufficient health literacy is associated with increased financial strain on health-care systems and is correlated with inadequate quality of care.[34]

On the other hand, participation in health-promoting activities significantly influences an individual's health status and has a considerable impact on disease prevention. These behaviors include researching health issues, getting regular checkups, exercising, eating a balanced diet, getting enough sleep, nurturing positive relationships, and being aware of diseases.[35] These activities are crucial because they reduce the risk of disease, enhance the quality of life, and reduce the financial burden of healthcare on society.[36]

Problem Statement

The objective of this study is to examine the impact of health literacy and health-promoting behavior on the relationship between health anxieties, emotional regulation, and cyberchondria among the Pakistani population. This research aims to enhance our comprehension of the factors that influence individuals' online health information-seeking behavior and its emotional consequences in a specific context.

Research Gap and Hypothesis

In summary, cyberchondria can be attributed to various factors, including health anxiety, emotional regulation, and health literacy. Numerous scholarly investigations have been conducted to examine the correlation between health anxiety, emotional control, and health literacy as potential predictors of cyberchondria among individuals.[13,22] But we have not examined the influence of health-promoting behavior on cyberbullying among the population of Pakistan. Therefore, this study aims to examine the moderating role of health literacy and health-promoting behavior of individuals in the relationship between health anxiety and cyberchondria with the mediating role of emotion regulation. The hypothesis of the study includes

H1: health anxiety has an association with emotional regulation.

H2: emotional regulation has an association with cyberchondria.

H3: health literacy moderates the relationship between health anxiety and emotional regulation.

H4: health promoting behavior moderates the relationship between emotional regulation and cyberchondria.

H5: emotions mediate the relationship between health anxiety and cyberchondria.

The following Figure 1 shows the hypothetical model of the research.

Significance of the Study

The study has the significance of the following reasons: this study uncovers the effects of cyberchondria on mental health. This study fills the gap in Pakistani literature and offers insight applicable to diverse populations. It advances scientific

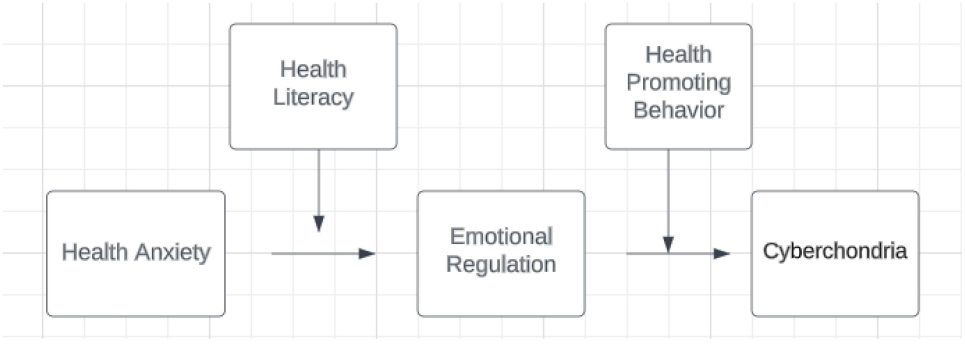

Figure 1 Hypothetical Model of the research.

understanding of psychological factors in online health information seeking behavior. The findings may guide health policies and interventions in Pakistan and contribute to academic knowledge in health psychology, communication, and public health.

Methods

Participants

In the present study, using a cross-sectional research design, data was collected between the months of May 2022 and September 2022, focusing on the national population of Pakistan. Sample size determination was a pivotal aspect of research design. We employed G-Power software to calculate the sample size. This calculation was guided by a predetermined statistical significance level, with a power of 80%, a confidence level of 95%, and a margin of error set at 5%. A total sample size of 846 individuals was determined to be the appropriate representation of the broader population. We distributed a total of 900 self-administrated questionnaires. Convenient sampling is the method employed to facilitate data collection. Each participant's active and informed consent was obtained prior to their inclusion in the study. As part of the study's exclusion criteria, participants who self-reported the use of non-prescribed medications were omitted from the final data set. Statistical analysis was applied to a total of 755 participants' responses, and the response rate was 83%.

Measures

In this study, we employed the Short Health Anxiety Inventory, a validated 18-items self-reported questionnaire to access an individual's level of health anxiety experienced over the proceeding 6 months.[37] A theoretical framework of this scale is grounded in the cognitive model of health anxiety. The Cronbach's alpha of this scale was 0.87.

In order to assess emotion regulation, we employed the difficulties in emotion regulation scale.[38] The DERS questionnaire comprises 36 items, each prompting participants to evaluate statements such as "I have difficulty understanding my emotions" on a 5-point Likert scale, with response options ranging from 1 (almost never) to 5 (almost always). The internal consistency of the DERS items, as indicated by Cronbach's alpha (α), was calculated to be 0.80, demonstrating a high level of reliability.

The Cyberchondria Severity Instrument-Short Form (CSS-12) is a self-administered survey consisting of 12 items that have been specifically developed to evaluate an individual's level of online health-related anxieties.[39] Participants are asked to evaluate each item using a 5-point scale, with 1 representing "never" and 5 representing "always". The scale employed in this study assesses multiple variables, including compulsion, discomfort, and medical skepticism, which collectively aid in the identification of cyberchondria. Within the framework of our study, it is seen that the CSS-12 has a notable degree of internal consistency, as shown by a Cronbach's alpha coefficient of 0.79.

The current research used the HLS19-Q12, a recently updated version of the European Health Literacy Survey Questionnaire, to measure the participants' health literacy. This instrument measures how well people can locate, understand, evaluate, and make decisions based on health-related information. The survey has 12 items that were designed to follow the health literacy standards laid out by Sørensen et al.[31] Based on the results of the European Health Literacy Survey, there are two levels of health literacy: inadequate (with scores ranging from 0 to 33) and adequate (with scores ranging from 33 to 50).

The Health Promotion Lifestyle Questionnaire (HPLP-II) uses six categories to classify 52 items related to health promotion behavior: Topics covered include weight control and nutrition (9 items, 9–36 points), physical activity (8 items, 8–32 points), stress management (8 items, 8–32 points), spiritual growth (9 items, 9–36 points), interpersonal relationships (9–36 points), and responsibility towards health (9–36 points). A Likert scale with the following four alternatives was used to collect data from the study's participants: 1 for never, 2 for occasionally, 3 for sometimes, and 4 for often. The total score, which is the result of adding all the individual scores in all dimensions, might be anything from 52 to 208. The total score can be understood in the following way: low scores (52–91) indicate unhealthy habits, average scores (92–130) indicate fair habits, acceptable scores (131–169) indicate good habits, and excellent scores (210–208) indicate great habits. The scale had a Cronbach's alpha of 0.95.[40]

Data Analysis

In the current study, we applied descriptive statistics on demographic variables and to test the hypothesis we applied Hayes PROCESS, which is a popular tool for conducting mediation and moderation analyses. Hayes PROCESS analysis allows for the simultaneous examination of both mediation and moderation effects within a single analytical framework. This integration provides a more comprehensive understanding of the relationship among variables.

Results

According to Table 1, which shows all the basic information about the 755 people who took part in the study, the sample size was quite large. The table presents a full study of four important variables: gender, age, residential location, and qualification. After each variable, there is a full list of groups and the percentage (F %) that shows how often each one appears. The table gives a full list of members by gender, showing that the group is very diverse. The study looks at people who say they are male (30.1%), female (40.2%), transgender male (12.9%), and transgender female (15.8%). "Age" gives information about how the members are spread out among different age groups. It is interesting to note that 47.9% of the sample is made up of people between the ages of 25 and 44, which is the most common age group. Other age groups that make important inputs to the study are those between the ages of 18–24 (28.4%), 45–64 (13.5%), and 65 and older (10.2%). According to the study's results, residential location makes a big difference between urban and rural subjects; about 40.6% of the group lives in rural areas, while 59.4% live in urban areas. Additionally, the qualification variable shows how much education each person has. It includes categories like 8% illiteracy, 7% primary education, 9% middle education, 26% metric education, 16% diploma degree, 24% college credentials, and 6% university credentials.

The study had a sample size of 755 people who willingly completed the survey and agreed to participate in the research. The average replies of these participants were examined using a scale that classified the presence of several

Table 1 Characteristics of Study Participants (N=755)

Variables	Categories	F(%)
Gender	Male	228 (30.1)
	Female	304 (40.2)
	Transgender Male	98 (12.9)
	Transgender Female	125 (15.8)
Age	18–24	215 (28.4)
	25–44	362 (47.9)
	45–64	102 (13.5)
	65 above	76 (10.2)
Residential Place	Rural	307 (40.6)
	Urban	448 (59.4)
Qualification	Illiterate	64 (8.4)
	Primary	56 (7.4)
	Middle	75 (9.9)
	Metric	203 (26.8)
	Diploma Degree	126 (16.6)
	College	184 (24.3)
	University	47 (6.2)

psychological and health-related elements. This study's findings provide insights into participant distribution across various intensity levels of the researched factors (Figure 2). A total of 32% of participants in the health anxiety study were classified as having "Low" levels of health anxiety, 53% as having "Moderate" levels, and 15% as having "High" levels. The subjects' emotional regulation levels were broken down as follows: 25% had "low" emotional regulation, 46% had "moderate" emotional regulation, and 29% had "high" emotional control. In terms of the phenomenon known as Cyberchondria, 18% of the people had "Low" levels, 41% had "Moderate" levels, and 41% had "High" levels. In terms of health literacy, the survey found that 29% of respondents had "Moderate" levels of health literacy, while 56% of those polled had "Low" levels of health literacy. A total of 15% of the participants did not meet the "High" health literacy standard. The following percentages of participants were polled in terms of health-promoting behavior: 28% reported "Moderate" levels, 23% reported "High" levels, and 49% reported "Low" levels.

The study assessed the health-promoting activities of the participants across various dimensions (Figure 3). The domain of spiritual practice received a maximum score of 24.6%, suggesting that individuals rely predominantly on spirituality as a means to enhance their health. Subsequently, interpersonal activities received a score of 19.7%, indicating that social connections and relationships significantly influence the health-promoting behaviors of the participants. A considerable amount of emphasis was placed on weight management and dietary practices, as evidenced by the impressive score of 17.1%. The observation of stress management behaviors at 15.2% suggests that while participants do

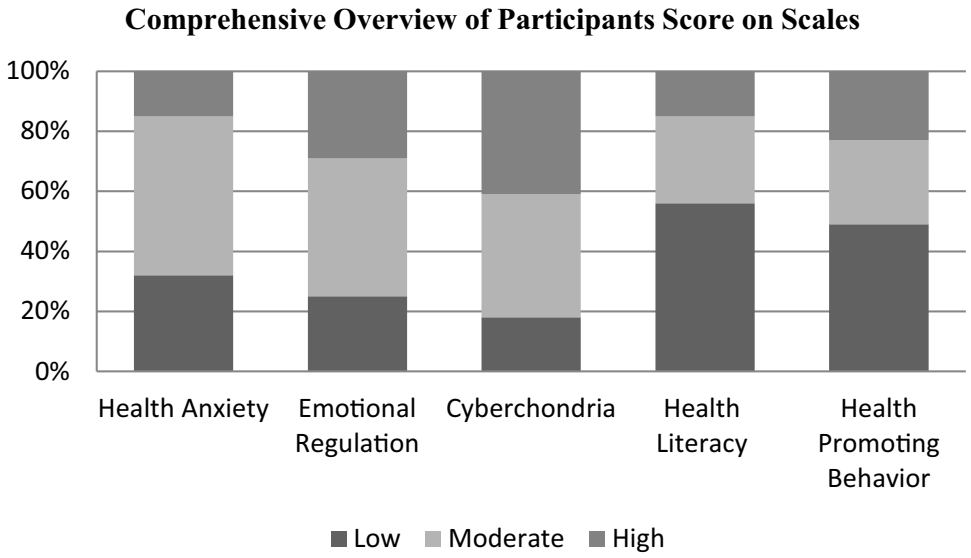

Figure 2 Mean Score of Participants on the Scales.

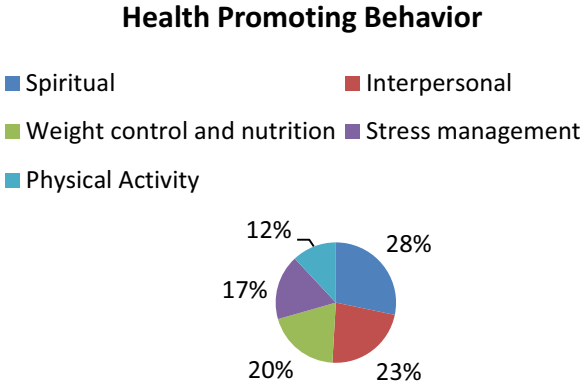

Figure 3 Health Promoting Behavior of Participants.

engage in some activities that alleviate stress, further progress is still possible. Physical exercise received the lowest overall score, 10.4, indicating that participants utilized this aspect of health promotion less frequently. The findings indicate a diverse array of health-promoting activities, with spirituality and interpersonal connections receiving relatively more attention than exercise and stress reduction. This distribution indicates potential domains that could benefit from targeted interventions aimed at enhancing holistic well-being.

Table 2 presents the descriptive statistics and correlation coefficients for the variables under study. The table displays the mean (m) and standard deviation (SD) of each variable. Health Anxiety (HA) exhibits a significant positive correlation with emotional regulation ($r=0.53$, $p<0.05$) and a negative correlation with health literacy ($r=-0.64$, $p<0.01$). It also shows a significant negative correlation with the health promotion behavior ($r=-0.42$, $p<0.01$). Health anxiety has a significant positive correlation with cyberchondria ($r=0.54$, $p<0.01$). The mean score of health anxiety is 3.68 with a standard deviation 2.1. Emotional regulation demonstrates a significant positive correlation with health literacy ($r=0.32$, $p<0.05$) but does not show a significant correlation with health promotion behavior ($r=0.20$) and cyberchondria ($r=-0.03$, $p<0.05$). The mean score of emotional regulation is 4.21 with a standard deviation of 1.75. Moreover, health literacy has a significant negative correlation with health promotion behavior ($r=-0.43$, $p<0.05$) but does not show a significant correlation with cyberchondria ($r=0.056$). The mean score of health literacy is 3.78 with a standard deviation of 0.78. Similarly, health promotion behavior shows a significant negative correlation with cyberchondria ($r=-0.42$, $p<0.01$). The mean score for health promotion behavior is 2.96 with a standard deviation of 0.58.

In Table 3 regression analysis was conducted to examine the direct relationship between HA and ER. The analysis reveals several important findings. First, path coefficient (β) for the relationship between HA and ER was −0.48, indicating a negative association between these two variables. This implies that as levels of health anxiety increase, emotional regulation tends to decrease. The R square value (R^2) of 0.133 suggests that approximately 13.3% of the variance in emotional regulation can be explained by variations in health anxiety. Additionally, the standard error (SE) associated with this relationship was 0.04. The t-statistic value of 7.24 is significant at the $p<0.01$ level, indicating a strong statistical relationship between HA and ER. On the other hand, the relationship between emotional regulation and cyberchondria exhibits a significant positive beta coefficient ($\beta=0.38$, $p < 0.035$), implying a direct positive relationship. This model explains 2.7% variance in cyberchondria ($R^2= 0.027$)

Table 2 Descriptive Statistics and Correlation

Variables	1	2	3	4	5	M(SD)
1. HA	–	0.53*	−0.64**	−0.36*	0.54**	3.68 (2.1)
2. ER		–	0.32*	0.20	−0.03*	4.21 (1.75)
3. HL			–	−0.43*	0.056	3.78 (0.78)
4. HPB				–	−0.42**	2.96 (0.58)
5. CC					–	1.54 (0.32)

Notes: *p < 0.05, **p < 0.01.
Abbreviations: HA, Health Anxiety; ER, Emotional Regulation; HL, Health Literacy; HPB, Health promotion behavior; CC, Cyberchondria.

Table 3 Regression Analysis (Direct Effects Among Variables)

Direct Variable	β	R^2	SE	t	p
HA→ER	−0.48**	0.133	0.04	−7.24	0.01
ER→CC	0.38*	0.027	0.06	3.75	0.035

Notes: *p < 0.05, **p < 0.01.
Abbreviations: HA, Health Anxiety; ER, Emotional Regulation; CC, Cyberchondria.

Table 4 Mediation Analysis

Interactive Variables	Beta	Standard Error	t	P	LL/UL
HA *ER→CC	0.25**	0.047	4.89	0.001	0.075/0.282

Note: **p < 0.01.
Abbreviations: HA, Health Anxiety; ER, Emotional Regulation; CC, Cyberchondria.

Table 5 Moderation Analysis (Interactive Effect)

Interactive Variables	Beta	Standard Error	t	P	LL/UL
HA→ER	−0.23**	0.08	−4.52	0.00	−0.12/–0.27
HA *HL→ER	−0.42*	0.06	−8.31	0.031	−0.05/0.19
ER→CC	−0.20**	0.05	−3.01	0.00	−0.032/–0.12
ER *HPB→CC	−0.27*	0.05	−2.91	0.022	−0.03/0.28

Notes: *p < 0.05, **p < 0.01.
Abbreviations: HA, Health Anxiety; ER, Emotional Regulation; HL, Health Literacy; HPB, Health promotion behavior; CC, Cyberchondria.

with a standard error of 0.06, and the association t –statics was 3.75. Overall, the values suggest that while there is a significant positive relationship between emotional regulation and cyberchondria.

Table 4 presents the results of a mediation analysis. This analysis aims to shed light on the process by which health anxiety may influence cyberchondria through the mediating effect of emotional regulation. In this context, beta coefficient of 0.25, with a standard error of 0.047 revealed that emotional regulation has a significant positive mediating interaction between health anxiety and cyberchondria. The confidence interval of interaction range is from 0.075 to 0.282, suggesting a substantial mediating effect within this interval.

Table 5 presents the moderation effects of health literacy and health promotion behavior between the study variables. Moderation interaction of health literacy (HL) revealed a notable negative moderation effect in which beta coefficient of this interaction is β=−.42 (p<0.031), and it has a standard error of 0.06. The t-value of −8.31 is statistical significant at p=0.031. The confidence interval of this interaction is within the range of −0.05 to 0.19. The second moderation interaction of health promoting behavior between emotional regulation and cyberchondria is also examined and the moderation interaction of health promotion behavior reveled the significantly negative moderation effect in which beta coefficient of this interaction is β=−0.27 (p=0.22).

Discussion

This study aims to investigate the prevalence of health anxiety and cyberchondria within the Pakistani community. This study additionally investigated the mediating influence of emotional regulation, as well as the moderating effects of health literacy and health promotion behavior.

The prevalence of health-related concerns has increased due to the growing phenomenon of self-monitoring and self-diagnosis, referred to as cyberchondria. In the current study, participants revealed health anxiety scores (low 32% vs moderate 53% vs high 15%), and research findings indicate that there was a 10% increase in health anxiety over a span of 4 years.[41] Another study finding has indicated that there is a notable rise in health anxiety among the COVID-19 pandemic, with around 47.3% of individuals experiencing this condition.[42] Moreover, in the current study 41% participants revealed the moderate level of cyberchondria and 41% revealed the high level of cyberchondria, it is worth noting that the ratio of individuals with moderate and high cyberchondria levels is equal (Figure 2). Previous research has revealed that cyberchondria is a prevailing phenomenon, particularly among young adults; for example, a study conducted by Sabir and Naqvi, found that 60% of students engaged in self-diagnosis, and prevalence of cyberchondria among them was noteworthy, with 50% revealed moderate level and 23% were experiencing high level of cyberchondria.[43] A recent study conducted in India sheds light on the increasing prevalence of cyberchondria as a significant public mental health concern. The study revealed a prevalence rate

of cyberchondria at 55.6%. The primary pattern seen was an increased prevalence of internet-based health inquiries, a heightened desire for reassurance, and a notable presence of health anxiety.[44] In the current study, participants' health literacy and health promotion behavior was also measured and the results revealed that 56% participants have the low health-related literacy and 49% has the low health promotion behavior. When individuals lack sufficient health literacy, they encounter difficulties in distinguishing between reliable and misleading information, hindering their ability to take essential steps in disease prevention. As a result, they become vulnerable to misinformation, false news and untrustworthy resources, which can have a profound impact on their health-related behavior and potentially affect their overall well-being.[45]

This study additionally examines the direct impact, mediation, and moderation effects of the variables; as the study aims to examine the health anxiety effect on emotional regulation. The findings of our study revealed a significant negative association between health anxiety and emotional regulation. The findings of our study align with past research,[46] since our study participants exhibited high and moderate levels of health anxiety and scored low in emotional regulation. Additionally, our study examines the mediating effect of emotional regulation on the relationship between health anxiety and cyberchondria. Our findings indicate a strong positive correlation between emotional regulation and cyberchondria. Health anxiety is associated with a negative perspective, when the presence of any potential symptoms elicits thoughts such as, "I firmly believe that I will experience illness". This cognitive process might then initiate a harmful loop of affective states (expressed as somatic symptom disorder), cognitions, and actions (such as information-seeking).[6,15,47] Previous research has established a strong correlation between difficulties in emotional regulation and not only anxiety but also cognitive and behavioral aspects, including fear of falling (apprehensions regarding falling) and avoidance of physical activity.[48] Emotional regulation challenges may lead to the adoption of ineffective coping strategies to address health issues; consequently, individuals may seek health information from online sources rather than consulting health-care professionals.[1] Therefore, effective emotional regulation serves as a protective measure against excessive involvement in obtaining health information online and is associated with diminished levels of health anxiety.

Furthermore, the present study also examines the moderating role of health literacy and health promoting behaviors. The results revealed that health literacy significantly and negatively moderates the relationship between health anxiety and emotional regulation. As in the present study respondents showed the poor health literacy score, this is a major problem, especially given that poor health literacy exacerbated the negative effects of health anxiety on one's ability to manage one's emotions. Previous studies have reported that low health literacy is frighteningly common in low-income countries,[49] and research suggests that inadequate health literacy may have led to the worsening of these negative consequences.[50] According to the findings conducted by Afshari et al, a significant proportion of the participants, specifically 71.9%, exhibited weak health literacy.[51] Health literacy is a crucial factor and a significant influencer of health-care costs and results in modern health-care systems. It can be argued that the level of health literacy among individuals receiving medical treatment plays a crucial role in influencing their decision-making and behavior in relation to health promotion behavior.[52]

The current study also examines the moderating role of health promotion behavior between emotional regulation and cyberchondria. The results revealed that health promotion behavior significantly negatively moderates the relationship between emotional regulation and cyberchondria. Participants have low health promotion behavior. In simpler words, a low level of health-promoting behavior increases the negative impact of poor emotional regulation on cyberchondria. This suggests that participants are not optimally utilizing behaviors that mitigate the adverse effect of poor emotional regulation on cyberchondria. Given their low engagement in health promotion behavior, they are more susceptible to experiencing heightened levels of cyberchondria when they are unable to regulate their emotions effectively. Furthermore, current study participants revealed that they are less engaged in positive health practices like regular exercise, stress management, or maintaining healthy interpersonal relationships; they are more prone to worry about their health, and this worry leads them to constantly look up symptoms or disease online, feeling into the cycle of cyberchondria.

This study has a multifaceted theoretical contribution; firstly, this research deepens our understanding of the complex interplay between psychological factors and online health seeking behavior, particularly in the context of health anxiety and emotional regulation. By identifying health literacy and health promoting behaviors as a moderating factor, it sheds light on the nuanced ways in which individuals navigate and cope with health-related stressors in the digital age. Secondly, this study advances the theoretical framework surrounding cyberchondria by highlighting the significance of individual differences in health literacy and health promoting behavior in shaping the intensity and outcomes of cyberchondria. Third, it contributes to the

broader literature on health psychology and public health as the result highlights the importance of health-care providers administering comprehensive treatment plans for clients. Cyberchondria is worsening in patients who seek solace in questionable online resources for their health concerns. Collaboration among website administrators, health-care professionals, and physicians is critical for the integrity and reliability of online health information. Based on the findings of Dumitru et al, it is recommended that websites undergo accuracy checks and that access to sites containing dubious information be restricted or clearly labeled.[53]

The limitations of the study are acknowledged. The data collection process relies on self-reported measurements, which means we cannot establish cause and effect relationships. It is advised that future research initiatives incorporate longitudinal and experimental study designs. Although our study focused on a non-clinical population, future research on cyberchondria should include information about the participants' health problems.

Conclusion

Indeed, online forums are repositories of both accurate and erroneous health-related information. In our current study, participants demonstrated lower level of health literacy and engaged less in health promoting behaviors. Notably, their health literacy behaviors acted as moderators, negatively influencing the relationship between health anxiety and emotional regulation. Similarly, insufficient emotional regulation was found to contribute to the exacerbation of cyberchondria, with health-promoting behaviors playing a negative moderating role in this regard. Additionally, we observed that emotional regulation mediates the relationship between health anxiety and cyberchondria.

Data Sharing Statement

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

Ethics Approval and Consent to Participate

All the methods were performed in accordance with the Declaration of Helsinki. The study was approved by the Ethical Committee of University of Layyah. All the participants provided informed consent.

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Disclosure

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The authors declare no conflict of interest.

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