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ORIGINAL ARTICLE

Intolerance of uncertainty and cyberchondria among Pakistani young adults

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ABSTRACT

Objectives: To examine the relationship between intolerance of uncertainty (IU), including its components inhibitory IU and prospective IU, and cyberchondria, and to compare IU and cyberchondria across demographics such as gender, work status, education, and family system.

Methods: This cross-sectional study was conducted from April to August 2023 at National Institute of Psychology, Quaid-i-Azam University, Islamabad, after ethical approval. A purposive sample of 302 young adults aged 18-29 years who used the internet for health-related searches was included. Participants completed the Cyberchondria Severity Scale (CSS-12), the Intolerance of Uncertainty Scale (IUS-12), and a demographic questionnaire. The data were analyzed using SPSS version 25.

Results: The sample comprised 177 females (58.6%) and 125 males (41.4%). IU showed a significant positive correlation with cyberchondria ($r_s=0.59$, $p<0.01$). Inhibitory IU demonstrated a stronger positive association with cyberchondria ($r_s=0.64$, $p<0.01$) compared with prospective IU ($r_s=0.38$, $p<0.01$). Hours spent on the internet daily for health-related searches ($r_s=0.26$, $p<0.01$) and age ($r_s=0.28$, $p<0.01$) were also positively correlated with cyberchondria, whereas family monthly income (FMI) was negatively correlated with cyberchondria ($r_s=-0.41$, $p<0.01$). Cyberchondria scores were significantly higher among males, working individuals, participants with PhD-level education, and those living in nuclear family systems.

Conclusion: Intolerance of uncertainty, particularly inhibitory IU, is strongly associated with cyberchondria among young adults. Demographic factors also influence these psychological tendencies. Interventions targeting uncertainty management and responsible online health information use may help reduce cyberchondria.

Keywords: Young Adult (MeSH); Cyberchondria (Non-MeSH); Intolerance of uncertainty (Non-MeSH); Behavior (MeSH); Safety-seeking behavior (Non-MeSH); Internet (MeSH).

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INTRODUCTION

The relationship between psychological traits and online health-seeking behaviors has emerged as an intriguing topic in an age of digital information and connectivity.[1] With the rapid expansion of the internet and the easy availability of online health resources, web-based searches have become one of the most common methods for obtaining health-related information.[2] Several studies conducted in the United States and Europe report that more than 70% of adults who use the internet engage in searches related to health concerns.[3] Access to such information can enhance individuals' understanding of disease causes, symptoms, and preventive measures. However, when online health searches become repetitive and excessive, this behavior may evolve into cyberchondria, a pathological behavior.[4] Cyberchondria refers to compulsive online searching for health information that paradoxically increases health anxiety and psychological distress.[5] According to the cognitive-behavioral model of health anxiety, maladaptive beliefs about health and difficulty tolerating health-related uncertainty can trigger or exacerbate health anxiety. Individuals often attempt to reduce this anxiety through safety-seeking behaviors, most commonly repeated online searches for medical information, which may ultimately reinforce cyberchondria.[6] Intolerance of uncertainty (IU) is a psychological trait characterized by difficulty enduring the distress associated with uncertain or ambiguous situations.[7] IU comprises two key components: prospective IU, which reflects a tendency to seek information in order to reduce uncertainty about future events, and inhibitory IU, which reflects avoidance behaviors or behavioral paralysis when confronted with uncertainty.[8] Emerging evidence suggests that IU is an important psychological risk factor for cyberchondria, with inhibitory IU demonstrating a stronger positive association with cyberchondria than prospective IU among adults.[9,10]

In addition to cognitive vulnerabilities such as IU, a study conducted in Turkey showed that cyberchondria increases as monthly income decreases.[11] In developing countries like Pakistan, where approximately 44.7% of the population lives below the poverty line, limited financial resources reduce access to healthcare services, prompting greater reliance on online health information and potentially increasing cyberchondria.[12,13] Moreover, evidence from another study conducted in Turkey indicates that age is positively associated with cyberchondria among young adults.[14] Beyond these correlational demographic factors, evidence also highlights group-based

demographic differences in cyberchondria. Studies conducted in India, Turkey, and China suggest that cyberchondria tends to be more pronounced among males,[15,16] working individuals,[17] those with higher levels of education,[18] and adults residing in nuclear family systems.[19]

Despite documentation of demographic differences in cyberchondria internationally,[15-19] research in Pakistan exploring how cyb-erchondria and IU vary across demographics such as gender, work status, education, and family system remains limited. Furthermore, most available studies in Pakistan have primarily focused on clinically diagnosed populations,[20] with relatively few investigations conducted among healthy individuals. Although young adults tend to engage more actively with digital technologies and online health information than older adults, who may use the internet less frequently due to limited digital literacy,[6] existing research has largely examined cyberchondria within broader or mixed-age populations, with insufficient attention to young adults specifically. Consequently, it remains unclear whether the number of hours spent on the internet daily for health-related searches (HSI) is associated with increased cyberchondria among young adults.[21]

Furthermore, despite evidence suggesting that IU is a key cognitive vulnerability for cyberchondria, it remains largely unclear which dimension of IU, prospective or inhibitory, is more strongly associated with cyberchondria in the Pakistani context. Moreover, while international evidence suggests that lower socioeconomic status may be associated with higher levels of cyberchondria,[11] empirical research examining the role of family monthly income (FMI) in developing countries such as Pakistan remains scarce. Similarly, it is unclear whether the relationship between age and cyberchondria among Pakistani young adults follows patterns reported in international studies. Therefore, the present study aimed to examine the associations between intolerance of uncertainty (prospective IU and inhibitory IU), HSI, age, FMI, and cyberchondria among Pakistani young adults. Additionally, the study sought to explore differences in intolerance of uncertainty and cyberchondria across selected demographic variables.

Hypotheses

H1: IU, HSI, and age are positively correlated with cyberchondria, with inhibitory IU showing a stronger correlation with cyberchondria than prospective IU, while FMI is negatively correlated with cyberchondria.

H2: Cyberchondria will be significantly higher among males, working individuals, young adults with higher levels of education, and those residing in nuclear family systems.

METHODS

Study design and participants: A quantitative cross-sectional study was conducted from April 2023 to August 2023 at the National Institute of Psychology (NIP), Quaid-i-Azam University, Islamabad, Pakistan, after approval from the NIP Ethics Committee (Reference #: F. NO. D-107-4(04)/BS./Fall/2019-Admin/86 dated: April 17, 2023). A non-probability purposive sampling technique was employed to specifically target young adults (aged 18-29 years) who actively use the internet for health-related searches,[6] and have at least 12 years of education, as this group is most relevant to examining cyberchondria and IU. To ensure adequate power for detecting a correlation of 0.20 or higher using nonparametric analyses (Spearman's rank correlation), the required sample size was first estimated using the formula $N = [(Z\alpha+Z\beta)/C]^2 + 3$, with α (two-tailed) = 0.05, β=0.10, and an expected correlation of r=0.20, which yielded 259 participants. To account for the nonparametric nature of the analysis, 15% was added, resulting in a final target sample size of approximately 298 participants. During recruitment, 340 questionnaires were distributed to young adults. Of these, 320 were returned (response rate=94.1%). After excluding 18 incomplete questionnaires, 302 responses were retained for analysis, giving a final usable response rate of 88.8%.

Data were collected from various colleges, universities, and organizations in Rawalpindi and Islamabad. Participation was voluntary. The inclusion criteria for the sample were young adults using the internet for health-related searches, and their education level was at least 12 years of study. The exclusion criteria were those adults who were diagnosed with any psychological or physical disorder. Participants completed the English versions of the Cyberchondria Severity Scale (CSS-12) and the Intolerance of Uncertainty Scale (IUS-12), along with a demographic sheet (age, gender, education, etc.). All participants provided written informed consent, and data confidentiality was ensured. The final sample comprised N=302 young adults, including 125 males and 177 females, aged 18–29 years (M=22.76, SD=2.40), with an average family's monthly income of 91,205.30 PKR (M=91,205.30, SD=81,338.53) and an average of 1.33 hours per day spent on the internet for health-related searches (M=1.33, SD=1.26).

Measures:

1. The cyberchondria severity scale (CSS-12) was used to measure increased health-related anxiety resulting from excessive engagement in online health information searches. This 12-item short version of the original 33-item scale uses a 5-point Likert-type response format (1=never, 5= always). An example item is: "I start to panic when I read online that a symptom I have is found in a rare/serious condition." Reliability analysis indicated good internal consistency (α = 0.91). Higher total scores indicate greater cyberchondria.[5]

2. The intolerance of uncertainty scale (IUS-12) was used to measure individuals' reactions to uncertainty, ambiguous circumstances, and future events. This 12-item short version of the original 27-item scale also uses a 5-point Likert-type response format (1= not at all characteristic of me, 5 = totally characteristic of me). An example item is: "Unforeseen events upset me greatly." The total scale showed good reliability (α=0.82). IUS-12

corresponds to two subscales: Prospective IU (7 items, α = 0.74), reflecting the inclination of individuals to actively seek information to reduce uncertainty, and Inhibitory IU (5 items, α=0.76), reflecting avoidance-based responses or a feeling of paralysis in the face of uncertainty. Higher total scores indicate greater intolerance of uncertainty.[8]

3. A single-item question, "How many hours do you spend on the internet daily for health-related searches?" was used to measure the number of hours spent on the internet HSI daily for health-related searches.

All statistical analyses were conducted using SPSS version 25. Given that the IUS-12 and CSS-12 scales utilize Likert-type responses, which are ordinal in nature, non-parametric statistical analyses were employed, consistent with the recommendations of Jamieson S,[22] for treating Likert-type data. Accordingly, descriptive statistics are presented as medians and interquartile ranges (IQR). The analyses included: (1) demographic characteristics of the participants (frequencies and percentages); (2) reliability analyses and descriptive statistics of the study scales; (3) Spearman's rank-order correlation analyses to examine relationships among the study variables; and (4) group comparisons of study variables across gender, work status, education, and family system. For group comparisons, Mann–Whitney U tests were used for all binary variables (gender, work status, and family system), with effect sizes reported as r. For the multi-category variable education, the Kruskal-Wallis H test was applied, with effect sizes reported as η^2_H (eta-squared based on *H*). No control variables were included in the analyses, and there were no missing data. This approach ensured that all statistical procedures were appropriate for the level of measurement and distribution of the data, thereby providing robust and accurate results.

RESULTS

Table I presents the demographic characteristics of the participants (N=302). The sample comprised 177 females (58.6%) and 125 males (41.4%). A total of 216 participants (71.5%) were non-working. Regarding family system, 187 participants (61.9%) belonged to nuclear families. In terms of education, majority (n=210; 69.5%) of participants had completed bachelor's-level education.

Table II summarizes the descriptive statistics, reliability estimates, and Spearman's rank-order correlations among the study variables. All scales demonstrated satisfactory internal consistency, with Cronbach's alpha values ranging from 0.74 to 0.91. The median age of participants was 22 years, and the median time spent on the internet for health-related searches was 1 hour per day. Median scores for intolerance of uncertainty (IU) and cyberchondria were 39 and 38, respectively. Correlation analysis showed that IU was significantly positively associated with cyberchondria (rs=0.59, p<0.01). Among the IU dimensions, inhibitory IU demonstrated a stronger positive correlation with cyberchondria (rs=0.64, p<0.01) compared with prospective IU (rs=0.38, p<0.01). Time spent on online health-related searches (rs=0.26, p<0.01) and age (rs=0.28, p<0.01) were also positively correlated with cyberchondria, whereas family monthly income showed a significant negative correlation (rs=−0.41, p<0.01). Additional descriptive statistics and correlation coefficients are presented in Table II.

Table III presents the comparison of IU and cyberchondria (CYB) across selected demographic variables. Male participants showed significantly higher IU and CYB scores than females (IU: median 43 vs 36; CYB: median 49 vs 33; p<0.001). Similarly, working young adults reported higher levels of IU and CYB compared with non-working participants (IU: median 43 vs 37; CYB: median 50 vs 34; p<0.001). Significant differences were also observed across educational levels. Participants with PhD-level education demonstrated the highest median scores for both IU and CYB, whereas comparatively lower scores were observed among those with bachelor and master level education (p≤0.001). Regarding family system, participants living in nuclear families reported slightly higher CYB scores than those residing in joint families, while IU scores showed minimal differences between the two groups; however, these differences reached statistical significance (p<0.05). Overall, the findings indicate that IU and cyberchondria vary across demographic characteristics including gender, work status, education, and family system. Detailed group comparisons and effect sizes are presented in Table III, supporting the second study hypothesis (H2).

DISCUSSION

Building on the cognitive-behavioral model of health anxiety,[6] this study provides empirical support for both

Table I: Demographic characteristics of the participants (n=302)

Variables	Category	Frequency	Percentage
Gender	Male	125	41.4
	Female	177	58.6
Work Status	Working	86	28.5
	Non-Working	216	71.5
Family System	Joint	115	38.1
	Nuclear	187	61.9
Education	Intermediate	21	7.0
	Bachelor	210	69.5
	Master	57	18.9
	PhD	14	4.6

Table II: Descriptive statistics, reliability coefficients and spearman's rank-order correlations among study variables (n=302)

Variables	Age	HSI	FMI	IU	PIU	IIU	CYB	Items	Cronbach's alpha
Age	–	–	–	–	–	–	–	–	–
HSI	0.13*	–	–	–	–	–	–	–	–
FMI	-0.02	-0.04	–	–	–	–	–	–	–
IU	0.18**	0.12*	-0.24**	–	–	–	–	12	0.82
PIU	0.10	0.12*	-0.16**	0.87**	–	–	–	7	0.74
IIU	0.22**	0.09	-0.27**	0.84**	0.49**	–	–	5	0.76
CYB	0.28**	0.26**	-0.41**	0.59**	0.38**	0.64**	–	12	0.91
Median	22	1	65000	39	21	17	38	–	–
IQR	3	1.50	62000	12	7	7	19	–	–

Note: IQR=interquartile range, HSI=number of hours spent on the internet daily for health-related searches, FMI=family's monthly income, IU=intolerance of uncertainty, PIU=prospective intolerance of uncertainty, IIU=inhibitory intolerance of uncertainty and CYB=cyberchondria, *p<.05, **p <.01

Table III: Group differences in intolerance of uncertainty and cyberchondria across demographic variables (n=302)

Demographic Variables	Category	N	IU	p (IU)	IU Effect Size	CYB	p (CYB)	CYB Effect Size
			Median (IQR)			Median (IQR)		
Gender	Male	125	43 (8)	< .001***	0.36	49 (12)	< .001***	0.52
	Female	177	36 (12)			33 (12)		
Work Status	Working	86	43 (6)	< .001***	0.31	50 (5)	< .001***	0.53
	Non-Working	216	37 (12)			34 (13)		
Family System	Joint	115	39 (11)	0.048*	0.11	35 (22)	0.043*	0.12
	Nuclear	187	39 (12)			39 (18)		
Education	Intermediate	21	43 (14.50)	0.001**	0.05	39 (17.50)	< .001***	0.10
	Bachelor	210	38 (11.25)			36 (18.25)		
	Master	57	42 (13.50)			45 (15.50)		
	PhD	14	45.50 (4.25)			51 (5.25)		

Note: IQR=interquartile range, IU = intolerance of uncertainty, CYB=cyberchondria values are reported as median (interquartile range). Mann-Whitney U tests were used for all binary grouping variables (Gender, Work Status, Family System), and effect sizes are reported as r. Kruskal–Wallis H test was used for multi-category variable (Education) and effect sizes are reported as η^2H (eta-squared based on H). *p < .05, **p < .01, ***p < .001

hypotheses in the context of Pakistani young adults. Consistent with H1, intolerance of uncertainty (IU), particularly its inhibitory dimension, daily hours spent on the internet for health-related searches (HSI), and age were positively associated with cyberchondria, whereas family's monthly income (FMI) was negatively associated with cyberchondria. whereas family's FMI was negatively associated with cyberchondria. In line with H2, cyberchondria was significantly higher among males, working individuals, young adults with a PhD, and those residing in nuclear family systems. Collectively, these findings underscore the combined influence of cognitive vulnerability and demographic factors on cyberchondria in this population. Results revealed that IU is positively correlated with cyberchondria, and these findings align with existing empirical literature; a more recent study by Zangoulechi Z, et al.,[9] also reported a significant association between IU and increased severity of cyberchondria, the reason is that individuals with high IU often seek reassurance to alleviate their discomfort. When it comes to health issues, they may browse the internet for information repeatedly in order to obtain a sense of control and security, which might increase their cyberchondria. Similarly, the findings showed that inhibitory IU is more positively correlated with cyberchondria as compared to prospective IU among young adults. These patterns are consistent with previous research, as a study by Fergus

TA,[10] showed that inhibitory IU exhibited a stronger correlation with cyberchondria in a sample of adults, as compared to prospective IU. This may be because individuals high in inhibitory IU tend to experience paralysis or avoidance when faced with health-related uncertainty, particularly toward actions that require direct confrontation with uncertainty, such as consulting a doctor.[8] Although internet searching is an active behavior, it may function as a low-commitment and controllable coping strategy that allows individuals to avoid definitive medical evaluation. Consequently, individuals high in inhibitory IU may rely excessively on online health information to manage anxiety while simultaneously avoiding decisive health-related actions, thereby contributing more strongly to cyberchondria.[10]

The results additionally demonstrated that as the duration of online health searches increases, the severity of cyberchondria also increases. These findings are also in line with many previous researches as Doherty-Torstrick ER, et al.,[21] discovered that long-duration internet users reported a significantly higher level of hypochondriacally fears and a greater number of diseases feared than short-duration internet users. From a theoretical perspective, the cognitive-behavioral model of health anxiety,[6] suggests that intolerance of health-related uncertainty motivates safety-seeking behaviors. In the digital era, repeated online searches, which often require prolonged engagement, can serve as safety-seeking behaviors to alleviate this anxiety, but may ultimately manifest as cyberchondria. Similarly, the results of the study indicated that cyberchondria increases with age among young adults. These findings are consistent with past research, which found that age was positively associated with cyberchondria among young adults.[14] This may be because, within the young adult age bracket, higher age can be associated with greater exposure to technology and online health information, which increases the likelihood of engaging in health-related searches. The results also indicated a negative association between FMI and cyberchondria. These findings corroborate a study conducted in Turkey, which showed that cyberchondria increases as monthly income decreases.[11] This trend may be explained in the context of developing countries like Pakistan, where approximately 44.7% of the population lives below the poverty line.[13] Limited financial resources reduce access to healthcare services, prompting greater reliance on online health information and, consequently, higher levels of cyberchondria.[12,13]

Findings also suggested that males are higher on cyberchondria as compared to females. Many previous studies have also similar findings like recent study in India found that cyberchondria was higher among males as compared to females.[15] Similarly, Peng XQ, et al.,[16] found that there are variations in the cyberchondria total score between males and females, with males exhibiting slightly higher scores than females. One potential explanation is that, in the Pakistani context, males often carry greater social and occupational responsibilities and are more likely to be employed.[23] Consequently, they may have less time or opportunity for face-to-face consultations with healthcare professionals, relying instead on online searches for health information. Extending this reasoning, the present study also found that working young adults reported higher levels of cyberchondria compared to non-working peers. These two findings, higher cyberchondria among males and among working young adults, complement each other. In Pakistan, men are expected to work and support their families; as a result, busy schedules and limited time for in-person medical consultations may contribute to higher levels of cyberchondria. This result is also consistent with previous literature, as a study found that the working group scored higher on cyberchondria as compared to the non-working group.[17] The study results also indicated higher levels of cyberchondria among young adults with a PhD-level education compared to those with intermediate, bachelor's, and master's levels of education. Özkan O, et al.,[18] also stated the similar findings that individuals with a greater level of education tend to exhibit higher levels of cyberchondria. The prevalence of cyberchondria among individuals with a higher level of education is believed to stem from their exposure to a significant amount of incorrect information. Moreover, the findings of the analysis indicate that young adults residing in the nuclear family system demonstrated considerably higher levels of cyberchondria in comparison to those young adults residing in joint families. Previous studies showed the same findings as Bala R, et al.,[19] revealed that cyberchondria is notably higher among individuals residing in nuclear family systems in comparison to those residing in joint family systems. This may be because, in a joint family system, there are more people with whom individuals can share and discuss medical concerns, providing emotional support and reassurance. In contrast, young adults in nuclear families may lack this broader support network, which may contribute to higher levels of cyberchondria.

Contributions and implications

This study sheds light on cyberchondria in Pakistani young adults, demonstrating that IU, particularly inhibitory IU, is strongly linked to higher cyberchondria. Males, working individuals, young adults with a PhD, and those residing in nuclear families were identified as at-risk groups, while longer daily online health searches and lower family's income further increased vulnerability. Collectively, these findings extend international research to a developing country context and highlight the importance of interventions promoting responsible internet use and improving access to professional medical consultation. Importantly, the study emphasizes the need to raise awareness of cyberchondria and IU, as interventions fostering uncertainty-coping strategies and encouraging medical consultations can reduce health-related anxiety and reliance on unreliable online information, guiding safer and more informed health behaviors.

Limitations of the study

Despite its contributions, this study has several limitations. The cross-sectional design limits causal inference; future

longitudinal or experimental studies are needed to clarify the temporal relationship between IU and cyberchondria. Moreover, cyberchondria remains an emerging construct with no established diagnostic criteria, highlighting the need to develop standardized diagnostic criteria. Finally, translating scales into Urdu may enhance cultural relevance and improve their psychometric properties in Pakistani samples.

CONCLUSION

Building on the cognitive–behavioral model of health anxiety, this study demonstrates that cognitive, behavioral, socioeconomic, and demographic factors, including intolerance of uncertainty, particularly inhibitory IU, longer online health searches, and lower family's income, are key drivers of cyberchondria among young adults. Cyberchondria was also higher among males, working individuals, those with higher levels of education, and those residing in nuclear families. By situating these findings in a developing country context, the study advances theoretical understanding of cyberchondria and highlights the need for culturally informed interventions.

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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

SZA: Conception and study design, acquisition, analysis and interpretation of data, drafting the manuscript, approval of the final version to be published

NKR: Conception and study design, acquisition, analysis and interpretation of data, critical review, approval of the final version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest, whether financial or otherwise, that could influence the integrity, objectivity, or validity of their research work.

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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