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Metacognitive Beliefs, Uncertainty Intolerance, Neuroticism and Cyberchondria among Parents of Children with Neurodevelopmental Disorder

by

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CERTIFICATE OF APPROVAL

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Abstract

The current research aimed to explore the relationship between metacognitive beliefs, intolerance of uncertainty, neuroticism, and cyberchondria among parents of children with neurodevelopmental disorder. Based on a critical literature analysis, it was postulated that a strong association existed between cyberchondria, intolerance of uncertainty, metacognitive beliefs, and neuroticism, with neuroticism acting as a moderator and intolerance of uncertainty acting as a mediator. The sample was further categorized into two groups, namely males (n = 65) and females (n = 185). The participants' ages ranged from 20 to 49 years. The scales used to collect the data included the Intolerance of Uncertainty Scale-12 (IUS-12), Metacognitions Questionnaire–Health Anxiety (MCQ-HA), Cyberchondria Severity Scale-12 (CSS-12), and the Neuroticism scale from the Big Five Inventory (BFI). The data were analyzed and interpreted using descriptive statistics, Pearson correlation, and mediation and moderation analyses. The findings revealed strong correlations among the study variables. The results highlight important implications for clinical interventions and future research directions.

Keywords: Cyberchondria, uncertainty intolerance, metacognitive beliefs, neuroticism, and Neurodevelopmental disorders

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Abbreviations

BAI	Beck Anxiety Inventory
CI	Confidence Interval
COVID-19	Coronavirus Disease 2019
Df	Degrees of Freedom
IU	Intolerance of Uncertainty
LL	Lower Limit
M	Mean
MCQ-30	Metacognition Questionnaire-30
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
UL	Upper Limit
WHO	World Health Organization

Chapter 1

Introduction

Rearing a child with a neurodevelopmental disorder (NDD) is a complex emotional, psychological, and social cluster of problems that can considerably influence the family dynamics and the well-being of parents. Autism Spectrum Disorder (ASD), Specific Learning Disorder (SLD), and Attention Deficit/Hyperactivity Disorder (ADHD) are NDDs, which manifest as a combination of developmental, behavioral, and functional challenges that parents must support over extended periods of time and adapt to (Ozturk & Guzel, 2025). It has been established that parents of children with NDDs have regularly reported higher parenting stress, diminished quality of life, and increased psychological stress than parents of typically developing children (Houser et al., 2023; Méndez-Lara et al., 2025; Pardo-Salamanca et al., 2025). In fact, parents of children with ASD and ADHD are reported to suffer much greater stress, emotional burden, and caregiving burden compared to control parents, and these are usually related to the intensity of child symptoms and behavioral difficulties (Operto et al., 2021). Such increased demands hurt the mental health and family functioning of parents, which, in addition to child development, contributes to the development of caregiving capacity, emotional resilience, and family well-being (Houser et al., 2023; Pardo-Salamanca et al., 2025). Notably, parenting stress in these settings has been reported to be continuous throughout the developmental periods, indicating the long-lasting caregiving tasks and worry regarding future adaptive functioning, hence the necessity of the interventions that are aimed at parental support and systemic family resources.

Consistent with this perception, there is some evidence that the caregiving of adolescents and youth with autism spectrum disorder (ASD) and attention-deficit hyperactivity disorder (ADHD) is characterized by high levels of emotional and psychological load, and the caregivers of persons with ASD recorded considerably greater levels of load, which was largely explained by the presence of unmet emotional, behavioral and mental health needs (Cadman et al., 2012). Modern studies also confirm that the burden of caregivers in NDDs is multidimensional and is not only dependent on the severity of symptoms in children but also on the contextual and psychosocial aspects, which predetermine the coping capacity of parents (Houser et al., 2023). Parents of children with neurodevelopmental disorders (NDDs) tend to go through greater psychological distress because of the uncertainty and difficulty of the care needs. The individual variations in personality traits and thinking abilities can also affect the way parents react to such issues. As an example, it has been found that increased neuroticism is associated with increased emotional responsiveness and susceptibility to stress, and intolerance of uncertainty can further increase anxiety and worry in uncontrollable or uncertain caregiving circumstances (Carleton, 2016). Equally, the maladaptive metacognitive beliefs, like beliefs regarding the unchanged ability of thoughts, can lead to intensification of ruminative thoughts and worsen distress (Wells, 2011). Such mental processes may also lead to a state of cyberchondria, where too much searching on the internet on matters related to health increases anxiety about the state of the child. These cognitive and personality variables are important in determining the parents who are more prone to psychological strain and developing a specific intervention (Houser et al., 2023).

This is a characteristic of neurodevelopmental disorders caregiving since there is always a sense of uncertainty concerning the diagnosis, developmental progression, treatment effectiveness, and subsequent functioning of the child. Such chronic worry, emotional exhaustion, and psychological vulnerability may be aroused by this continuing state of uncertainty. Intolerance of uncertainty, which is a dispositional inability to endure the distress of ambiguity, is more closely linked to increased psychological burden and caregiver burden in parents of children with neurodevelopmental disabilities like autism spectrum disorder, which is why it is

relevant in caregiving situations where unpredictable situations frequently occur (Mansoor, 2025). People who are more intolerant of uncertainty are more likely to use excessive Internet searching of health-related information, which is called cyberchondria and is characterized by the repetitive search of health-related information via the Internet that increases anxiety, but does not reduce it (Starcevic & Berle, 2013; McElroy & Shevlin, 2014).

Empirical investigations also confirm that intolerance of uncertainty is the only factor that is uniquely associated with cyberchondria severity, implying that concern about ambiguity is the cause of the maladaptive information-seeking behavior related to health (Snorrason & Woods, 2014). Besides, cognitive conceptualizations of cyberchondria highlight the significance of metacognitive belief regarding worry and uncertainty in intensifying and sustaining such recurrent search activities (Starcevic & Berle, 2013). These actions can be interpreted in even more comprehensive cognitive-emotional frameworks, placing intolerance of ambiguity and maladaptive worry as a major process in the perpetuation of anxiety (Buhr & Dugas, 2002). These vulnerabilities in thinking may be further exacerbated in parents of children with NDDs by uncertainty associated with developmental outcomes, which, in turn, raises their dependence on reassurance-seeking and fear-driven coping mechanisms to cope with the distress.

Besides cognitive vulnerabilities, dispositional personality characteristics like neuroticism can also enhance the emotional reactivity and anxiety-based patterns of thought. Neuroticism is always linked with increased sensitivity to stress, negative affectivity, and inability to control emotions, which can be the sources of enhanced anxiety when caring (Barlow et al., 2018; Lahey, 2009).

The neurotic individuals also interpret ambiguous situations as a threat and react with increased emotional distress. In the caregiving environment where chronic stress and uncertainty exist, neuroticism can thus increase vulnerability to anxiety, health worry, and maladaptive coping behavior amongst parents. Combined with maladaptive beliefs regarding worry and intolerance of uncertainty, and high neuroticism, constitute an inter-relationship characterizing the experience, interpretation, and regulation of anxiety among parents of children with NDDs (Jeronimus et al., 2016).

Parental functioning, emotional regulation, and self-efficacy are influenced by the presence of cognitive processes, especially metacognitive beliefs, in the developmental challenges. Metacognitive beliefs denote the beliefs of the individuals concerning the nature, utility, and controllability of their thoughts, which also encompass worry-related beliefs as well as the belief in the danger or inability of thinking (Wells, 2011; Starcevic & Berle, 2013). These maladaptive cognitive patterns create an interconnected system of cognitive processes and emotions when they are coupled with intolerance of uncertainty and high neuroticism, which alters the ways parents of children with neurodevelopmental disorders (NDDs) experience, perceive, and manage anxiety (especially within the context of constant exposure to information and ambiguity, e.g. searching online health information) (Jeronimus et al., 2016). The system assists in understanding the increased susceptibility to cyberchondria and the undying psychological distress witnessed in the setting of caregiving to children with NDDs.

Zarinkolah et al. (2025) established that metacognitive beliefs and the quality of the parent-child interactions had a significant influence on predicting parental self-efficacy in mothers of children with learning disabilities. The results indicate that successful management of families with chronically or developmentally disabled children needs to focus on behavioral strategies as well as the mental processes that affect how the parents cope with stress and emotional loads. A literature review involving populations of caregivers and physical illnesses also shows that negative metacognitive beliefs, especially beliefs in the uncontrollability and danger of worry, are closely predictive of anxious and depressive symptoms, despite accounting for demographic and illness-related factors (Lechner-Meichsner et al., 2023).

The metacognitive frameworks are, therefore, a useful way of comprehending the distress of caregivers. Maladaptive metacognitive beliefs have been successful in interventions that aim to alleviate anxiety and depressive symptoms, which enhance psychological functioning and coping abilities. Metacognitive theories can be used to explain psychological distress as maladaptive metacognitive beliefs, in particular, negative beliefs about repetitive negative thinking, are closely linked to anxiety and depression because they support perseverative cognitive processes

(Kannis-Dymand et al., 2020). A more recent meta-analysis affirmed significant relationships between maladaptive metacognitive beliefs and anxiety and depression at development stages, and found especially strong associations between negative beliefs about the uncontrollability and danger of worry (Mueller et al., 2024). Likewise, dysfunctional metacognitive beliefs have also been linked to emotion dysregulation, whereby individuals who believe they have no control over thoughts find it more challenging to regulate emotional reactions (Ecker et al., 2014).

Notably, maladaptive metacognitive beliefs can increase sensitivity to ambiguity and uncertainty, which is a direct cause of intolerance of uncertainty and worry. This conceptual overlap highlights metacognition as one of the primary processes that connect cognitive vulnerabilities to anxiety in populations of caregivers. The Self-Regulatory Executive Function (S-REF) model postulates that the Cognitive Attentional Syndrome (CAS) is a maladaptive cognition, which is triggered by maladaptive metacognitive beliefs and is defined by repetitive worry, surveillance, maladaptive coping, and perpetuates distress (Lechner-Meichsner et al., 2023). Parents tend to experience persistent rumination and reassurance-seeking behaviors, and their emotional exhaustion tends to rise over time as they perceive their worries to be out of control and need to prevent harm.

These processes are complicated by the digital transformation of health information access. Online health information seeking has emerged as a predominant coping strategy, with more than 7 percent of all Google searches accounting for over one billion daily health-related searches per day (Murphy, 2019). The quality of information on the Internet about health, however, is a wide range, starting with evidence-based materials and ending with alarming and misleading information. Although knowledge-seeking behaviors are normal, some dispositional characteristics make one more susceptible to maladaptive behaviors like cyberchondria (Murphy, 2019). Cyberchondria is defined by extreme and frequent internet research on health issues, which makes them more anxious and disrupts daily activities as well as intensifies reassurance-seeking (Snorrason & Woods, 2014; Fergus, 2013).

The studies have always shown that the relationship between cyberchondria and health anxiety is strong and that the disorder is supported by dispositional vulnerabilities such as intolerance of uncertainty, low self-esteem, neuroticism, and

maladaptive metacognitive beliefs (Fergus & Dolan, 2014; Fergus & Spada, 2017, 2018). Such patterns may be especially sensitive to children with neurodevelopmental disorders and their caregivers since their health and long-lasting stress levels are at risk (Benson, 2012). In the case of parents of children with NDDs, excessive searching online health information can serve as an effort by parents to minimize uncertainty and gain back some control, but it has the opposite effect of increasing anxiety and distress. It is important to understand the relationship between cyberchondria and neuroticism, intolerance of uncertainty, and metacognitive beliefs among this population to learn more about the psychological processes that contribute to caregiver distress and to shape the interventions in this area.

1.1 Neuroticism

Personality traits have been extensively associated to the difference of stress reactivity in individuals especially in situations that are uncertain. It has been indicated that intolerance of uncertainty is one of the reasons behind perceived stress by being more neurotic, so the emotionally more reactive to uncertain and stressful events are people high in neuroticism (Xu et al., 2023). In the parents of children with autism, whose lives are often characterized by erratic schedules and unpredictable developmental progress, these characteristics can contribute even more to parent stress and strain on marriage relationships. It has been suggested by earlier studies that personality factors, specifically neuroticism, correlate with increased emotional vulnerability, and the effect of neuroticism has been shown to be attributable to intolerance of uncertainty, which underlies the occurrence of maladaptive emotional and behavioral reactions (Bajcar & Babiak, 2020). This helps to further grasp the fact that parents with high levels of neuroticism can also react more to uncertainty and stress in caregiving, which affects the well-being of an individual and the functioning of a marriage.

Neuroticism is the individual trait that has been defined as being excessively sensitive to emotional experiences, having negative emotions (e.g., anxiety, sadness, worry), and prone to maladaptive coping styles, like avoidance, or over-reassurance seeking (Costa & McCrae, 1985). It was revealed that neuroticism is a powerful

indicator of different mental health problems, such as health anxiety, directly related to cyberchondria (Jeronimus et al., 2016). Parents having children with NDDs might feel more neurotic because they are constantly concerned about the state of their child and his/her future that makes them overestimate the risk of health and seek information on the Internet more often. This acting offers a false sense of security but usually leads to increased anxiety by further supporting the notion that there is something wrong with the health of their child, although this may not be backed by medical research.

1.2 Intolerance of Uncertainty

Intolerance of uncertainty (IU) is becoming one of the primary contributors to anxiety and other related symptoms in children and adolescents, whose ramifications in parenting are serious. Parents of children with Autism Spectrum Disorder (ASD) are often faced with unpredictable day-to-day activities and constant uncertainty, which can only aggravate stress and adverse quality of life (QoL). To illustrate, Mansoor (2025) has discovered that intolerance of uncertainty was intoleration levels that were higher linked with a more significant burden of caregiving in caregivers of children with ASD and the lowering of the overall QoL of caregivers, where nearly two-thirds of caregivers reported their intolerance of uncertainty was moderate to high, and nearly 60 percent of caregivers reported their overall QoL was low, especially in their psychological and social domains (Mansoor, 2025). The findings underscore the need to implement IU in an attempt to reduce caregiver stress and improve well-being. Similar studies also indicate that cognitive behaviors related to IU, including inflexibility of the psyche, are some of the causes of anxiety and stress in caregivers in general. This evidence implies that it is possibly important to focus on the cognitive processes surrounding IU and inflexibility to diminish anxiety and enhance mental health outcomes in the caregiving populations.

Intolerance of uncertainty (IU) means the inability to tolerate a lack of clear, sufficient, or predictable information, and it may cause adverse emotional responses, including anxiety, worry, and distress (Carleton, 2016). Studies indicate that

parents and caregivers of children with neurodevelopmental disorders, especially autism spectrum disorder, have more intolerance towards uncertainty and a higher psychological burden because of the caregiving responsibilities, which have a negative impact on their health and quality of life (Mansoor, 2025). This may lead to heightened information searching by reducing ambiguity and seeking reassurance, and further health-related information seeking by such persistent uncertainty. It has been discovered that high IU people have a higher tendency to practice health-related worry and reassurance-seeking behaviors, such as over-online medical information searching (Berenbaum et al., 2008; Fergus & Spada, 2018). Thus, with the context of caring about children with NDDs, IU can contribute to vulnerability to cyberchondria by creating the urge to repeat information-searching behaviours in attempts to mitigate distress related to uncertainty.

Cyberchondria also seems to reach its peak among those who are unable to tolerate uncertainty (IU). It has been demonstrated that IU substantially reinforces the linkage among frequent online health-related searching and an augmented level of health anxiety, such that individuals who are unable to endure ambiguity are more likely to encounter an augmented worry in reaction to online medical content (Fergus, 2013). A longitudinal research shows that there is a two-way relationship between online health information seeking and health anxiety, where people with more anxiety seek health online more often, and such a relationship further increases levels of anxiety over time (Te Poel et al., 2016). Even though this feedback loop is most prominent among non-clinical populations, the trend is indicative of the fact that over-online searching will keep anxiety sustained and lead to cyberchondria and the amplification of psychological stress in caregivers who are constantly confronted with uncertainty.

1.3 Metacognitive Beliefs

In a large meta-analysis, the moderately significant association between health anxiety and online health information seeking (r =.34) and the strong association between online health information seeking and cyberchondria (r =.62) were

reported, contributing to anxiety and uncertainty as the determinants of maladaptive coping behavior (McMullan et al., 2019). These results indicate that parents who are experiencing chronic stress, e.g., parenting neurodevelopmentally disabled children, might be specifically susceptible to repeated online health searches and increased concerns, which can adversely affect psychological health and family functioning.

The prevalence of higher levels of health anxiety and cyberchondria is also predicted by maladaptive metacognitive beliefs and, in particular, the uncontrollability of thoughts and the perceived threat of health-related information (Fergus & Spada, 2017; McMullan et al., 2019). The parents of children with neurodevelopmental disorders can report high levels of stress and uncertainty in the context of caregiving, which can increase the effect of these beliefs, resulting in repetitive online health searches and anxiety.

Metacognition involves the beliefs and thoughts that people have of themselves in relation to their thinking processes, such as how they can monitor, control, and evaluate their cognition (Flavell, 1979; Wells, 2011). These beliefs may have an effect on emotional regulation, problem-solving, and coping strategies, especially when stress or uncertainty prevails. It is indicated that metacognitive beliefs, especially the ones concerning the uncontrollability of thoughts and the perceived threat of health-related information, predict greater levels of health anxiety and cyberchondria, and the beliefs regarding the uncontrollability of thoughts are significant predictors of future scores on cyberchondria (McMullan et al., 2019). Studies indicate that maladaptive anxiety patterns are more prone to be perpetuated by individuals who perceive themselves as being unable to control their thoughts related to health or even dangerous (McMullan et al., 2019; Fergus & Spada, 2017). The results reveal the importance of metacognitive beliefs as thinking processes that can perpetuate the process of over-searching and high levels of distress.

Such beliefs have the potential to contribute to the phenomenon of cyberchondria through their tendency to make people more inclined to find information online, which is often viewed as a means to gain control of their concerns related to health (Bailey & Wells, 2015b). Bailey & Wells (2015b) and Melli et al. (2018) propose that those who think that their health concerns are either uncontrollable

or dangerous have more chances of excessive online searches to alleviate anxiety, which only increases anxiety.

Also, the beliefs that can be considered as metacognitive beliefs regarding illness, including beliefs that the thoughts regarding health problems cannot be stopped or that health problems are especially dangerous, were proven to be the key contributors to the emergence of cyberchondria and its further progression (Barlow et al., 2018). Studies have shown that those who possess more pronounced maladaptive metacognitive beliefs are more inclined to repeat online health searches and have higher levels of health-related anxiety, which may be explained by negative selective attention on threatening information and the effort to suppress unpleasant thoughts (Starcevic et al., 2019).

Research also indicates that such maladaptive metacognitive patterns can be combined with other vulnerability factors (including intolerance of uncertainty and more neurotic tendencies) to heighten the susceptibility to excessive health-related internet use as people with elevated neuroticism and low levels of toleration of uncertainty can overestimate threat and seek reassurance by engaging in repeated searching, which further supports the development of anxiety and compulsive behaviour (McElroy & Shevlin, 2014).

Neuroticism is a trait that predisposes individuals towards increased emotional activity and stressfulness, thereby resulting in increased vulnerability to uncertainties in the health of their child. Empirical studies have shown that neuroticism is positively linked to cyberchondria, and this connection has been attributed in part to increased levels of intolerance of uncertainty and maladaptive metacognitive beliefs about health-related thoughts (Torabi & Pourmohammad, 2025).

This trend is increased by intolerance of uncertainty, the resulting discomfort in the face of ambiguity and uncertainty, thus making people find the information online as a means of alleviating distress (Kerns et al., 2013). The beliefs about metacognition, in particular, the beliefs that address the health-related concerns as being beyond control or hazardous, give rise to the cognitive scheme that keeps the cycle of cyberchondria going and promotes excessive and repeated health information searching (Fergus & Spada, 2017; Torabi & Pourmohammad, 2025).

1.4 Background of the Study

Individuals who had been diagnosed with hypochondriasis in the past are often called and diagnosed to have health anxiety (Asmundson et al., 2001). Cyberchondria, which is the excessive web searching of medical information, has been identified to worsen health-related anxiety (Kerns et al., 2013). Although health anxiety is mainly caused by the wrong interpretation of physical symptoms, cyberchondria is the outcome of excessive health information seeking by means of repetitive use of internet resources and intensification of distress and concern. Parents of children with neurodevelopmental disorders can be especially susceptible to anxiety about health-related information and search of repetitive information online due to the increased stress experienced as a caregiver and the constant uncertainty about the health status and development of the child (Bajcar & Babiak, 2020)['. In addition, maladaptive metacognitive beliefs, including the effects of worrying being uncontrollable or essential, can support a loop of searching the Internet too much and becoming increasingly anxious (Fergus & Spada, 2017).

This research will attempt to examine the connection between three variables, neuneuroticism, intolerance of uncertainty, and metacognitive beliefs, and cyberchondria among parents of children with NDDs. The research aims to shed light on the reasons why parents are more prone to cyberchondria and what can be done to facilitate the situation through understanding these psychological mechanisms. By considering these factors, specific methods of reducing excessive internet use and its adverse influence on the psychological state of parents can be designed.

Though cyberchondria has been researched widely in general populations, there is scant research that has been done on parents of children with NDDs. The current research tends to focus on individual predictors (e.g., IU or neuroticism) separately, and not put them in the framework of one study. Moreover, the previous studies have focused more on Western cultures, and little has been done on the cultural/family variables applicable to Pakistan.

In the current study, gaps will be filled by:

This research is expected to examine the interactive impact of metacognitive beliefs, intolerance of uncertainty, and neuroticism on cyberchondria in parents of

children with neurodevelopmental disorders. In particular, it aims to investigate the interaction of these cognitive and personality factors to affect excessive online health-related information seeking. Further, the paper attempts to examine the processes of mediating and moderating between two variables in one integrated design to examine whether some variables are mediating or conditional variables in the relationship between parental cognitive-emotional traits and cyberchondria. Through the answers to these goals, the study offers an all-inclusive perspective of the interwoven cognitive-emotional system that influences the development of anxiety behaviors during caregiving situations.

1.5 Gap Analysis

The tendency of entering cyberchondria, experiencing anxiety after searching information about health issues online, has gained criticism during the digital age as people often turn to online platforms to self-diagnose and receive health-related advice (Amini & Ahadzadeh, 2025). Instead of reducing anxiety, over internet searching tends to enhance distress, especially in patients who are already inclined towards health anxiety. The meta-analytic evidence has shown that there are strong links between health anxiety, online health information-seeking, and cyberchondria, which underscores how patients with a high level of health anxiety tend to adopt compulsive symptoms of reassurance to a greater degree (McMullan et al., 2019; Starcevic et al., 2019). The given pattern of behavior is particularly salient to the parents of children with.

Since the increasing amount of studies focusing on cyberchondria and its cognitive-emotional predictors, there is a significant lack of literature on parents with children with neurodevelopmental disorders (NDDs). The vast majority of available literature on cyberchondria, neuroticism, intolerance of uncertainty (IU), and metacognitive beliefs have been performed on general adult community samples (e.g., (Fergus & Spada, 2017; McMullan et al., 2019)) or in student samples (e.g., recent mediation evidence in university samples) as opposed to high stress caregiver samples (e.g., found associations between personality traits, IU, metacognition, and cyberchondria in non-caregiver samples). The studies that have examined

risk factors, such as IU and anxiety sensitivity, in relation to cyberchondria have primarily involved community adults and identified general correlates but not clinical or caregiver subgroups (Gilchrist et al., 2015). Thus, there is a research gap that would consider the influence of these factors, in particular in the context of parents who experience chronic caregiving stress, health-related uncertainty, and complex decision-making, as is typical when children have NDDs under their care. These gaps are relevant to fill the knowledge gaps on the prevalence, severity, and mechanisms of cyberchondria in high-stress caregiver populations, which might be at variance with overall sample trends.

1.6 Problem Statement

The internet today has become a major source of health information to a vast number of people, especially when other means of accessing healthcare are limited or expensive. The change is particularly prominent in the low- and middle-income countries, where the cost of healthcare is high, and the infrastructure is limited, because of which individuals tend to resort to online sources to seek medical advice (McElroy & Shevlin, 2014; McMullan et al., 2019).

This trend poses a unique problem to parents who have children with neurodevelopmental disorders (NDDs). These caregivers often face long periods of not knowing what the diagnosis of their child is, as well as their prognosis and treatment, and this is a major cause of emotional and psychological burden. It is empirically proven that such parents are characterized by high anxiety and depression (Benson, 2012). Financial, social, and emotional needs of caregiving are extensively reported, as evidenced by the observation that caregivers complain of tiredness, sleeping problems, lack of socialization, and constant stress due to monitoring the condition of their child (Benson, 2012).

Cyberchondria can not only escalate the level of health anxiety but can also increase the burden of care on parents who are already under constant stress (McMullan et al., 2019). Although the phenomenon of cyberchondria is becoming a subject of research in the general adult population, its expression in the caregiver group and, more precisely, its expression in parents of children with NDDs

is under-researched. Intolerance of uncertainty (IU) and metacognitive beliefs are the psychological factors that are hypothesized to play a central role in cyberchondria. It has been found that IU is closely linked to anxiety disorders and maladaptive repetitive thinking and can mediate the correlation between personality traits (i.e., neuroticism) and worry (Freeston et al., 1994; Mazidi et al., 2025). Similarly, negative metacognitive beliefs that include the belief that worrying is uncontrollable are associated with more online health searches and health-related distress (Wells, 2011; McMullan et al., 2019).

Furthermore, it has been shown that personality trait neuroticism is associated with cyberchondria: neurotic people tend to develop health anxiety and obsessive health information-seeking on the Internet. Structural models indicate that the impact of neuroticism on cyberchondria could be mediated through metacognitive beliefs, cognitive biases, and emotion dysregulation (McMullan et al., 2019). On the same note, neuroticism and cyberchondria are linked through intolerance of uncertainty, which has been identified to mediate the relationship between the two variables in empirical studies (Mazidi et al., 2025).

Although an increasing body of evidence has been presented to support the relationship between neuroticism, intolerance of uncertainty, and maladaptive metacognitive beliefs in relation to health-related anxiety and repetitive seeking of online health information, there is a paucity of empirical research studies that have investigated the collective contribution of the three factors to cyberchondria among parents of children with neurodevelopmental disorders. This is a significant literature gap because caregivers of children with neurodevelopmental disorders are deemed a high-risk population since they are constantly exposed to uncertainty, experience higher levels of caregiving stress, and have to make decisions related to health-related issues (Bajcar & Babiak, 2020).

However, insufficient attention to their online health-seeking behavior patterns and cyberchondria vulnerability has been a vast gap in the research, where community adults or student populations have been used in the majority of studies (Fergus & Spada, 2017; McMullan et al., 2019). Such inconsideration has theoretical and practical consequences. In theory, a combination of personality factors, IU, and metacognitive beliefs into a single framework might lead to a better insight into

the etiology of cyberchondria among caregiver groups. In practice, determining the psychological processes within cyberchondria among NDD caregivers would be beneficial in shaping more specific interventions, including metacognitive therapy or IU-based interventions, to decrease maladaptive health-searching and enhance psychological well-being.

Thus, the current research is designed to address the connection between neuroticism, uncertainty intolerance, metacognitive beliefs, and cyberchondria in those parents of children with neurodevelopmental disorders, which is an important empirical and clinical gap.

Chapter 2

Literature Review

Neurodevelopmental disorders (NDDs) are a wide category of lifelong disorders that impair cognitive, motor, behavioral, and socio-emotional functioning, which includes autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), intellectual disability, and related disorders (systematic evidence indicates these disorders are chronic, heterogeneous, and frequently comorbid across populations). Recent systematic reviews show that the prevalence of neurodevelopmental disorders (NDDs) varies widely in the world. Attention-deficit hyperactivity disorder (ADHD) is estimated to have an incidence between 5 and 11 per cent in children all over the world, autism spectrum disorder (ASD) has an incidence rate that varies between 0.7 and 3 per cent, and other NDDs have a similarly heterogeneous distribution across populations, indicating high diagnostic, cultural, and methodological disparities (Polanczyk et al., 2015; Thomas et al., 2015; Zeidan et al., 2022). Regularly collected data show that parents of children with NDDs rank as having substantively greater levels of psychological distress and anxiety, depression, and parenting stress than their counterparts who have children with typical development (Singer, 2006; Vasilopoulou & Nisbet, 2016).

The meta-analytic and longitudinal results also indicate that the psychological burden is sustained across the cultural and socioeconomic background and over time, as a result of the continued pressures imposed on caregiving, behavioral control, and orchestrating specialized care (Neece et al., 2012). Besides the demands of caregiving, social stigma, scarce resources in the community, and poor formal

support are frequent challenges that families face, contributing to stress-induced by caregiving and poor psychosocial well-being (Papadopoulos et al., 2019). Taken altogether, these results highlight the need to study the interplay between the cognitive and emotional vulnerability of caregivers and the chronic stress of caregiving in complex social settings.

The heterogeneity of neurodevelopmental disorders and the proximity of symptoms explain why the caregiving requirements of these disorders vary greatly across families that may result in increased emotional load, intolerance of uncertainty, and even maladaptive cognitive and emotional reactions in caregivers (Hayes & Watson, 2013).The awareness of the heterogeneity of neurodevelopmental disorders provides a rationale to examine how individual differences in parental cognition and personality aspect are a factor that causes such practices, particularly among parents who Parenting a child with neurodevelopmental disorder is a difficult experience, and it is significantly different compared to bringing up typical children, and is commonly linked to high stress levels among parents, less consistent and positive parenting behaviors, and greater emotional and psychosocial demands among parents (Hayes & Watson, 2013; Neece et al., 2012).

The intensive caregiving role that is, in most cases, shared by parents of children with neurodevelopmental disorders (NDDs) spans the entire lifespan, which means that the levels of stress that may be experienced can directly affect the quality of management of the treatment needs of the child. Recent findings also point to the fact that parental psychological strain does not exist in a vacuum, and it is very closely correlated with other psychosocial factors in determining treatment adherence.

Empirical evidence suggests that elevated parental stress is associated with reduced engagement in treatment-related practices, indicating that emotional overload may limit caregivers' ability to consistently implement therapeutic routines. Moreover, it has been found that affiliate stigma, which is expressed through the shame experienced internally and perceived societal judgment of a child after his or her diagnosis, is a major barrier to treatment engagement and caregiving involvement and is a strong negative predictive of caregiver participation (Mak & Kwok, 2010; Kinnear et al., 2016).

On the other hand, family resilience was protective in nature; parents who described resilience as higher exhibited higher adherence levels, which shows that adaptive coping mechanisms and supportive parental relationships cushion the effects of psychological strain. Mediation research suggests that the association between parental stress and reduced treatment engagement is partly explained by affiliate stigma, with caregiver resilience playing a protective role in attenuating these negative effects. These results indicate that emotional burden and stigma intertwine with family strengths, which creates a need to consider clinical counseling as a means of positively influencing treatment adherence, but also explore the mental health, stigmatization experiences, and resiliency-building among the caregivers. Multidimensional support is vital in maximizing the developmental outcomes and maintaining long-term therapeutic attendance in families of children with neurodevelopmental disorders (Mak & Kwok, 2010; Kinnear et al., 2016).

Parents of children with neurodevelopmental disorders are prone to significant psychological burden related to their child with unusual developmental requirements,Past studies reveal that parental stress and coping mechanisms are important factors in determining how caregivers are responding to uncertainty and health-related news, thus affecting emotional adaptation and caregiving behaviors (Hayes & Watson, 2013; Bajcar & Babiak, 2020). These results point towards the potential of caregiv- ing stress in enhancing anxiety and maladaptive behavior and form a conceptual basis as to why cognitive and personality vulnerabilities, in the form of metacog- nitive beliefs, intolerance of uncertainty, and neuroticism, can predispose parents of children with NDDs to cyberchondria. By the concentration on these cognitive- emotional elements, the current research builds on the previous research on the topic of caregiver stress and coping, exploring the role of individual variations in thinking patterns and emotional reactivity as the factors that affect the tendency to excessively seek health-related information online among this group of people.

McMullan et al. (2019) have noted that there is no mainstream definition, but most of the conceptualizations focus on its connection to health anxiety, reassurance-seeking behaviors, and certain metacognitive beliefs. Problematic Internet use and the symptoms of obsessive-compulsive disorder have been linked to cyberchondria

with serious consequences on the health of the population, including impaired functioning and a change in healthcare use. According to theories, people may experience repetitive health-related searches as a coping action to anxiety, but the situation is that people do it to the detriment of their stress. Though preventive and management methods have been suggested, empirical research is piecemeal, and the position of cyberchondria as a clinical entity has not yet been established with clear-cut research. These findings highlight the need to treat cyberchondria where parental stress levels are high, like looking after children with neurodevelopmental disorders, to decrease maladaptive coping and promote psychological well-being (Starcevic et al., 2019).

The proliferation of the Internet as a source of health information, which is also known as online health research (OHR), carries a huge implication on parental stress and anxiety, especially for the caregivers of children with neurodevelopmental disorders (NDDs). Panerai et al. (2002) performed a systematic narrative review, which was based on investigating the correlation between OHR and health anxiety, and showed that people who have a higher level of health anxiety are more prone to use OHR, have more distress after searches, and indicate more medical consultations. As much as OHR can play an assurance-seeking role, which acts as a temporary relief to anxiety, it can also lead to compulsive and distressing behavior. The authors suggested an integrative framework in which problematic and compulsive OHR are differentiated and positive and negative metacognitions impact the evolution of the former. This model specifically applies to the parents of children with NDDs because increased caregiving stress can exacerbate dependence on online health information, which can potentially strengthen the loops of worry and maladaptive coping. Such dynamics would be useful to conduct interventions that help to decrease parental anxiety, enhance adaptive information-seeking, and nurture psychological well-being (Panerai et al., 2002).

The utilization of the Internet to access health information by parents is widespread and may have a significant impact on health-related decision- making in parents and children. Previous research has documented a strong association between cyberchondria, limited health literacy, and maladaptive health behaviors among parents. Research has shown that parents often make online self-diagnoses and

health decisions on behalf of their children using internet information, a factor that has led to increased anxiety and poor health decision-making such as the failure to adhere to treatment.

It is also indicated that poor health literacy adds to the behaviors, which makes one more dependent on untrustworthy internet sources and supports the tendency to seek health information compulsively. Such results demonstrate the danger of such poor health-related decisions that may be caused by cyberchondria and the relevance of interventions that can be implemented to enhance the level of health literacy in parents and foster adaptive information-seeking skills (Fergus & Dolan, 2014; Starcevic & Berle, 2013; McMullan et al., 2019).

Haberkamp et al. (2021) carried out a meta-analysis and systematic review to study the conceptualization of cyberchondria and its relations with health anxiety, obsessive-compulsive symptoms, intolerance of uncertainty, and anxiety sensitivity. The quantitative synthesis that included over 3,000 subjects revealed that there was a significant positive relationship between cyberchondria and health anxiety (r = .63), that is, there was a significant overlap with anxiety-related characteristics. In the same manner, conceptually a cyberchondria was a health-related safety behavior which was to be reinforced intermittently by acute deflections of anxiety, and paradoxically perpetuates distress over the long term.

Drawing on the results, the authors developed an integrative cognitivebehavioral model, in which it is essential to differentiate between the trait and state elements and recognize triggers, risk factors, and consequences using the longitudinal and experimental studies. These results highlight the need to place cyberchondria in a context of mental health support, especially when parents report high levels of caregiving stress, as the excessive search of health information online can contribute to the development of anxiety and support the continuation of maladaptive coping strategies (Haberkamp et al., 2021).

The necessity to situate cyberchondria in a mental health-supporting framework has become especially relevant in the face of increased online health information searching as a response to the COVID-19 pandemic. Empirical studies are always in agreement that cyberchondria has a positive relationship with health anxiety

implying that the practice of excessive searches on the Internet about health issues is attributed to increased levels of anxiety. The research also indicates that health literacy is protective in the given relationship because high health literacy could also decrease the use of unreliable online information and decrease the negative effects of cyberchondria on health anxiety (Fergus & Dolan, 2014; McMullan et al., 2019). Past studies have found gender differences in cyberchondria and health literacy with females reporting more cyberchondria and males showing more health literacy with no consistent sex differences in health anxiety. Such results support the need to enhance health literacy as a health defense against the negative psychological impacts of cyberchondria especially among parents and caregivers who face high caregiving stress levels when dealing with the health issues of children with neurodevelopmental disorders. Intervention studies can thus serve to show that psychoeducational and psychological support programs can be delivered in a structured manner and reduce the anxiety levels and support better-informed health decisions in high-stress caregiving populations (McMullan et al., 2019; Jungmann & Witthöft, 2020).

Research has found that the caregiver-oriented interventions that integrate psychoeducation, stress management, and training of coping skills are linked to the decrease of anxiety levels, depressive symptoms, and psychological distress in general. These interventions can also promote the capacity of the caregivers to tolerate uncertainty and emotional burden towards the condition of their child. The findings support the importance of nurse-led parent support or psychologist-led parent support, which focuses on coping skills, emotional management, and peer support to enhance caregiver functioning (Dykens et al., 2014; Feinberg, 2013).

In particular, these interventions may help parents of children with neurodevelopmental disorders to be better, as the structured psychosocial and psychoeducational interventions have been demonstrated to decrease intolerance of uncertainty, enhance adaptive coping, and improve quality of life among caregivers with potential downstream effects Even though intolerance of uncertainty has conventionally been researched among adults, there are emerging data revealing its applicability to children and adolescents, especially with regards to anxiety and health-based decision-making. The literature reviews indicate that anxiety may affect

decision-making, which may result in the enhancement of cognitive bias, e.g., it may overestimate risks and jump to conclusions that may undermine the quality of decisions. But in the population of intellectual and developmental disabilities or autism spectrum disorder, the way that anxiety influences the decision-making process is not well comprehended. These relationships need to be clarified because such knowledge could shape the discussion of interventions that would help these vulnerable groups to adapt to making adaptive decisions, minimizing the effects of anxiety on functioning, and improving real-life functioning (Dykens et al., 2014; Feinberg, 2013).

According to the metacognitive model, maladaptive metacognition beliefs and attentional control deficiencies are core Trans diagnostic factors that cause psychological disorders. Xie et al. (2023) examined the comparative role of these mechanisms in anxiety and depression symptoms in 351 children, 169 with primary anxiety disorder and 182 usual controls. Children who were anxious in the clinic were found to have more anxiety, reduced ability to control their attention, and maladaptive metacognitive beliefs that were more robust than those of the controls. In both groups, reduced attention control and more strongly held maladaptive metacognitive beliefs were linked to increased levels of symptoms, and the strongest predictor was metacognitive beliefs. Another finding was that within the community group, the interaction between metacognitive beliefs and attentional control was found to explain further variation in the symptoms. It is important to highlight that interventions that focus on both maladaptive metacognitions and attentional control could be significant in lessening anxiety and depressive symptoms in children. The recent developments in the knowledge about these mechanisms are of particular interest to caregivers and clinicians involved with children with neurodevelopmental disorders themselves because such knowledge may be applied to develop a strategy that will minimize anxiety, improve cognitive performance, and enhance overall developmental outcomes (Minns et al., 2019).

The importance of metacognitive beliefs in the conduct and persistence of depressive symptoms has become more and more prominent in the use of psychological models of depression. Recent studies note that the central contribution of metacognitive beliefs and intolerance of uncertainty in health-related anxiety

and cyberchondria is an extension of previous models that also indicate that they have a predictive and mediating effect on maladaptive information-seeking behaviors. As an illustration, it is stated that cyberchondria are essentially predicted by metacognitive beliefs of uncontrollability and biased thinking, and a stronger conviction in the impossibility to control thoughts predicts a greater extent of excessive online health searching and health anxiety symptoms (Weiss et al., 2022; Nadeem et al., 2022).

In addition, intolerance of uncertainty and metacognitive beliefs also seem to mediate the correlation between such personality characteristics as neuroticism and cyberchondria, as neurotic individuals might be more likely to engage in distress-driven Internet health searches due to the presence of ambiguity that is especially aversive to them and maladaptive beliefs about their cognitions (Torabi & Pourmohammad, 2025). Strong links between negative metacognitive beliefs and health anxiety are also supported by meta-analytic and prospective research and advance the notion that beliefs in the inability and threat of thoughts not only relate to health anxieties but also their potential to engage in repetitive safety-seeking behaviors, including cyberchondria (Satici et al., 2022).

Altogether, these results demonstrate the topicality of maladaptive maladaptive metacognitive beliefs and intolerance of an uncertain situation as the two processes in the genesis of excessive health-related internet searching and high levels of psychological distress in parents of children with neurodevelopmental disorders. In addition to the cognitive processes on an individual level, the available evidence on health systems, and literature on medical education indicate that the organizational health and well-defined health policies are very important in supporting the caregivers and care delivery. Healthcare organization reviews have shown that properly organized policies and organizational health models are crucial to the stability of the system, predictable services, and providing support to families dealing with complex and long-term health-related issues (Scott, 2000).

Indirectly, such policy-level and organizational interventions can assist parents of children with neurodevelopmental disorders by enabling them to coordinate care, to access accurate health information, and/or professional assistance in making health-related decisions. Metacognitively, there has been extensive study of

the phenomenon of cyberchondria, defined as recurrent and distress-maintaining health information-seeking via the web. In a two-part study that involved U.S. community adults who regularly used the internet as a source of health information, Fergus & Spada (2017), Metacognitively, there has been extensive study of the phenomenon of cyberchondria, defined as recurrent and distress-maintaining health information-seeking via the web.

In a two-part study that involved U.S. community adults who regularly used the internet as a source of health information, The results con- firm the presence of a metacognitive conceptualization of cyberchondria, in which maladaptive beliefs of the uncontrollability of thoughts may be a key factor in the perpetuation of the behavior and may serve as an explanation of why some parents of individuals with neurodevelopmental disorders (NDDs) become highly distressed when they attempt to find health information online Fergus & Spada (2017).

Discovered a strong association between cyberchondria and maladaptive metacognitive beliefs and beliefs involving the uncontrollability of thoughts. It is interesting to note that, these associations were still found to be significant in the presence of the anxiety sensitivity and intolerance of uncertainty, thus suggesting that metacognitive beliefs have an independent contribution in the pathogenesis and persistence of cyberchondria.

2.1 Theoretical Framework

The current research is based on the Transactional theory of stress and coping Lazarus (1984) which offers a thorough theoretical description of the interplay between individual traits, cognitive beliefs, and coping skills to lead to psychological results under the circumstances of long-term stress. This theory does not focus on stress as a stimulus or a response, but stress is a dynamic transaction between the individual and the environment, where individual traits influence the perceptions and coping of stressors.

Raising a child with a neurodevelopmental disorder is a challenging and emotionally challenging situation of uncertainty, responsibility, and constant health-related

anxieties. The said conditions are considered as chronic stressors according to the Transactional Theory, and they stimulate primary appraisal mechanisms wherein the person assesses the importance and a threat value of the situation (Lazarus, 1991). At this stage, personality traits are on the center stage. High neuroticism, in which there is greater emotional responsiveness, negative affectivity, and sensitivity to danger, is a trait that predisposes the tendency to evaluate ambiguous or threatening situations as upsetting and overwhelming (Costa & McCrae, 1992). Neuroticism is continually measured by empirical research to be associated with high levels of anxiety, worry related to health, as well as maladaptive responses to stress (Ormel et al., 2013).

In this theoretical context, intolerance of uncertainty is a cognitive appraisal style that escalates stress responses by making people view ambiguity as unpleasant, threatening, or uncontrollable. According to the Transactional Theory, uncertainty increases stress when an individual is not sure of his or her power to predict or control the outcomes (Lazarus, 1984).

Uncertainty intolerance has been identified to increase anxiety, worry, and health-related vigilance, especially among caregiving groups that are subjected to continuous diagnostic uncertainty and unpredictable symptom progressions (Dugas et al., 1998; Koerner & Dugas, 2008). Constant doubt about the prognosis and the effectiveness of the treatment in the parents of the child with the neurodevelopmental disorders can thus increase the stress appraisals and emotional distress.

The theory, after primary appraisal, focuses on secondary appraisal, which entails analysing the available coping resources and strategies. At this point, metacognitive beliefs become very salient. The metacognitive beliefs indicate the beliefs of people regarding their thinking processes, such as beliefs about the usefulness, necessity, and controllability of worry and information seeking (Flavell, 1979).

In the process of coping with stress, these beliefs have an effect on the ways people manage their thoughts and emotions in response to perceived threats. The studies suggest that excessive worrying, reassurance seeking, and anxiety (especially in the context of health) are correlated with maladaptive metacognitive beliefs (Fergus & Spada, 2017; Bailey & Wells, 2015b).

Theoretically, it is possible to explain cyberchondria in the framework of the Transactional Theory of Stress and Coping as an emotion-oriented and maladaptive coping. Being in the state of distress in reaction to uncertainty and perceived threat, people can resort to repetitive online health information-seeking behavior, trying to eliminate anxiety and feel that they are in control and can exercise control (Starcevic & Berle, 2013). Nevertheless, the theory acknowledges that coping mechanisms can be poor or counterproductive. There is empirical evidence that cyberchondria temporarily suppresses the uncertainty but ends up sustaining or increasing anxiety due to the exposure to alarming information and confirmation of threats (McElroy & Shevlin, 2014).

When combined, the Transactional Theory of Stress and Coping is a complete theoretical explanation of the interrelationship between neuroticism, intolerance of uncertainty, metacognitive beliefs, and cyberchondria. Neuroticism increases the susceptibility to stress, intolerance of uncertainty magnifies threat appraisal, metacognitive beliefs influence coping evaluations, and cyberchondria becomes a maladaptive coping strategy as part of a continuous cycle of stress-appraisal-coping (Carleton, 2016). This theoretical approach is especially relevant in the case of parents of children with neurodevelopmental disorders, whose long-term uncertainty and caregiving needs place them in conditions of chronic interaction at the psychological process level.

2.2 Conceptual Framework

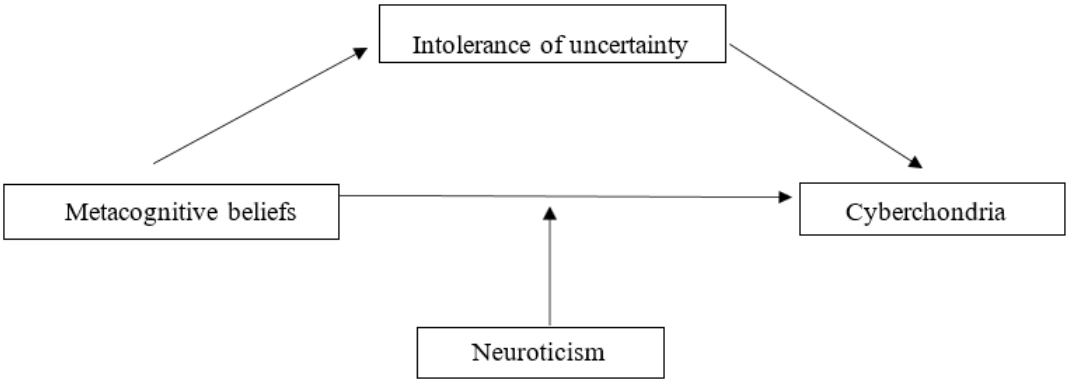

FIGURE 2.1: Conceptual Framework

The conceptualization of the present study is the outcome variable that is the result of a socialization of a mix of cognitive and personality factors with respect to cyberchondria. Namely, it assumes that the interplay between metacognitive beliefs, intolerance of uncertainty (IU), and neuroticism influences how much parents of children with neurodevelopmental disorders (NDDs) use excessive online health-related information seeking. Such maladaptive metacognitive beliefs may result in chronic rumination and repetitive thought, which contribute to the aggravation of anxiety and the promotion of behaviors including cyberchondria (Bailey & Wells, 2015b). Uncertainty intolerance increases the likelihood of parents facing ambiguous or unpredictable information about the status of their child as a threat and repeatedly searching the Internet to eliminate uncertainty (Dugas et al., 1998). Neuroticism raises anxiety and worry levels, and it puts individuals in a more vulnerable position regarding cyberchondria in stressful caregiving situations (Jeronimus et al., 2016).

Based on this, IU and metacognitive beliefs are theorized to mediate and/or moderate the association between neuroticism and cyberchondria, creating a connected cognitive-emotional system. Another aspect of the model that recognizes the caregiving environment of children with NDDs is its recognition as a context of ongoing uncertainty and information exposure that can aggravate these processes. In general, the conceptual framework offers a systematic knowledge of the interaction of cognitive vulnerability and personality traits in influencing maladaptive health-related information seeking among parents of children with neurodevelopmental disorders.

2.3 Research Objectives

O1: To identify the relationship between metacognitive beliefs, intolerance of uncertainty, neuroticism, and cyberchondria among the parents of Children with Neurodevelopmental Disorders.

O2: To identify the mediating role of intolerance of uncertainty in the relationship between metacognitive beliefs and cyberchondria among the Parents of Children with Neurodevelopmental Disorders.

O3: To identify the moderating role of neuroticism in the relationship between metacognitive beliefs and cyberchondria among the Parents of Children with Neurodevelopmental Disorders.

O4: To identify significant mean differences in metacognitive beliefs, intolerance of uncertainty, neuroticism, and cyberchondria across gender.

2.4 Hypotheses

H1: There is a relationship between metacognitive beliefs, tolerance of uncertainty, neuroticism, and cyberchondria among the parents of Children with Neurodevelopmental Disorders.

H2: Intolerance of uncertainty mediates the relationship between metacognitive beliefs and cyberchondria among the parents of Children with Neurodevelopmental Disorders.

H3: Neuroticism moderates the relationship between metacognitive beliefs and cyberchondria among parents of Children with Neurodevelopmental Disorders.

H4: There are differences across gender in metacognitive beliefs, intolerance of uncertainty, neuroticism, and cyberchondria among parents of Children with Neurodevelopmental Disorders.

Chapter 3

Research Methodology

3.1 Research Design

In the current research, the cross-sectional correlational design was used to investigate the correlation between cyberchondria, metacognitive beliefs, intolerance of uncertainty, and neuroticism in parents of children with neurodevelopmental disorders (NDDs). Correlational design is the best when a researcher wants to explore natural relationships among variables with no control or intervention, enabling a researcher to quantify the relationship between variables to each other as they exist in the world (Pubrica International, 2025). Cross-sectional studies, where the data is collected at one point in time, give a picture of the relationships among a population over a specified time, which are effective and convenient in the examination of several psychological constructs at the same time (De Vaus, 2001). Since the current research is not conducted to determine the causal effects but to explain and measure the relationship between cognitive and personality variables and cyberchondria, the cross-sectional correlational design will be suitable and ethical, not attempting to control variables but simply to record the information of the participants in their real situations under the caregiving (Pubrica International, 2025).

3.1.1 Sampling Procedure

The sample of participants consisted of 250 parents of children with NDDs who were recruited in purposive sampling in a special education center called Sedum special school, Soch clinic, Stcicld, and STL.

3.1.2 Inclusion Criteria

i. Having a child who is formally diagnosed with an NDD.
ii. Literacy in both English and Urdu.
iii. Access to regular Internet based on health related information.

3.1.3 Exclusion Criteria

i. Parents of children with medical issues that are not related to neurodevelopmental disorders.
ii. Participants who do not complete the entire questionnaire.

3.1.4 Sample Size Justification

The sample size of 250 was determined using an a priori power analysis conducted in G - power for a regression based model including a predictor, one outcome, one mediator and one moderator. Assuming a medium effect size ($f^2 = 0.15$), a significant level of 0.05, and a desired statistical power of 0.80, G - power indicated that a sample size within this range was sufficient to detect meaningful effects in the proposed model. Selecting 250 participants provides adequate power for testing both direct and conditional indirect effect, while also allowing for potential missing data and ensuring stable and reliable parameter estimates (Cohen, 2016; Field, 2024).

3.2 Time Horizon, Study Setting and Data Collection Procedure

3.2.1 Time Horizon

A cross-sectional time horizon was used in the study, where data were collected at one given point in time to see the relationships between the variables of interest.

3.2.2 Study Setting

The study has gone to a diverse selection of sights in order to obtain a diverse sample of parents, and this includes clinics and special education institutions referred to as Sedum special school, Soch clinic, Stcicld, and STL.

3.2.3 Data Collection Procedure

The data is collected with the help of questionnaires that are self-administered by the participants in the districts of Rawalpindi and Islamabad. The data is collected in the form of in-person data gathering in the schools of special education and in the clinics. Anonymous participation is voluntary.

3.2.4 Demographic Sheet

The necessary background information was gathered by designing a demographic sheet that was given to both the parents and the children who were to take part in the study. This questionnaire includes details such as:

i. The child's diagnosis of a neurodevelopmental disorder (NDD), age, and gender.

ii. The parents' age, educational level, and socioeconomic status.

iii. Family structure (e.g., extended family members living in one household).

The demographic data will facilitate the control of the possible confounding factors and make sure the sample can represent the features of families within the collectivist cultural settings.

3.3 Sampling Techniques

Purposive sampling of the sample was done among the public and private schools and colleges having children with special needs. This sampling method was used to make sure that the respondents used in the study satisfied the study requirements and that they were related to the research objectives.

3.3.1 Measures

3.3.1.1 Intolerance of Uncertainty Scale–12

Intolerance of uncertainty was assessed using the Intolerance of Uncertainty Scale Short Form (IUS-12), developed by Carleton et al. (2007). The IUS-12 is a self-report measure consisting of 12 items rated on a 5-point Likert scale, ranging from 1 (not at all characteristic of me) to 5 (entirely characteristic of me), with higher scores indicating greater intolerance of uncertainty.

3.3.1.2 Metacognitions Questionnaire–Health Anxiety

Bailey & Wells (2015a) created the Metacognitions Questionnaire -Health Anxiety. It is a 14-item scale that measures three metacognitive belief domains that refer to health anxiety:

i. **MCQ-C:** Beliefs about thoughts can cause illness (5 items)

ii. **MCQ-BT:** Beliefs about biased thinking (5 items)

iii. **MCQ-U:** Beliefs about thoughts being uncontrollable (4 items)

All items will be rated on a 4-point Likert scale of1 (disagreement), 4(strong agreement). The scale has high internal consistency; the scale scores are = 0.89

(biased thinking), = 0.83 (beliefs about uncontrollability), and equal = 0.78 and = 0.81 (beliefs about thoughts causing illness).

3.3.1.3 Cyberchondria Severity Scale–12

TheCyberchondriaSeverityScale-12(CSS12) is a 12-item measure in four sub- scales developed by McElroy & Shevlin (2014) as a refined version of the original CSS to deal with ambiguity and redundancy in theory. The domain of Mistrust was dropped because it has low factor loading and a weak association with the overall construct. CSS-12 has three ideal items for each of the following domains:

i. Excessiveness

ii. Distress

iii. Reassurance

iv. Compulsion

These areas are justified by a bifactor model. The items are rated on a 5-point Likert scale (1 = never through 5 = often).

3.3.1.4 Neuroticism Scale from the Big Five Inventory

Weinstock & Whisman (2006) have created a neuroticism Scale, which is informed by the Big Five Personality (Goldberg, 1992). It is an assessment of the personality attribute of neuroticism based on eight adjectives: tense, nervous, temperamental, irritable, envious, unstable, insecure, and emotional. The items are rated using a 4-point Likert scale. The scale has high validity because it has a high correlation (r =0.70) with the Neuroticism scale of the Revised NEO Personality Inventory.

Chapter 4

Results

4.1 Data Analysis

Such data were analyzed with the help of SPSS version 21, and a combination of correlational and descriptive types of data analysis was used to investigate the interrelations between cyberchondria, intolerance of uncertainty, metacognitive beliefs, and neuroticism between parents of children with neurodevelopmental disorders (NDDs).

The demographic variables were the child having an NDD diagnosis, age, gender, educational level, socioeconomic status, family structure, and employment status of the parent to make sure that a real representation of the targeted population was achieved.

Statistical calculations of SPSS 21 were performed to determine relationships among the study constructs: descriptive statistics, mean, median, range, and standard deviation of the study variables were computed, and frequencies of the demographic variables were determined.

The normality of the data distribution was tested by determining the significance and histograms. The internal consistency of the scales and their subscale was tested by calculating Cronbach's alpha reliability coefficients, and the relationships among the key variables were tested by the Pearson product-moment correlation coefficients.

The statistical data are organized in tables and figures to increase the clarity and interpretation of the data, and an independent samples t-test indicates the difference in means, SDs, and p-values to identify the sig- significance of the differences between genders.

The results are summarized in the tables below and then discussed in relation to every hypothesis with reference made to the corresponding supporting literature.

TABLE 4.1: Frequencies for Demographic Variables (N = 250)

Characteristics	**Category**	**F**	**%**
Gender	Male	65	26
	Female	185	74
Marital Status	Divorced	8	3.2
	Widow	7	2.8
	Married	235	94
Education	Matric	5	2
	Intermediate	32	12.8
	BA/BS	147	58.8
	MA/MS	59	23.6
	PhD	7	2.8
Socioeconomic Status	Lower class	10	4
	Middle class	207	82.8
	Upper class	33	13.2
Family Structure	Nuclear	157	62.8
	Joint	93	37.2
Employment Status	Employed	144	57.6
	Unemployed	106	42.4
Number of Children	1	151	60.4
	2	79	31.6
	3	18	7.2
	4	2	0.8
Diagnosis of the Child	Autism	135	54

Table 4.1 (Continued from previous page)

Characteristics	**Category**	**F**	**%**
	ADHD	39	14
	Speech Delay	36	12
	Others	50	20

The sample was composed of 250 individuals, 65 (26 percent) of whom are males and 185 (74 percent) women, which means that the sample is not homogeneous in terms of gender distribution. Marital status was also unequal, as 8 persons were divorced (3.2 percent), 7 were widowed (2.8 percent), and the majority of 235 individuals (94 percent) were married.

The level of education among the participants differed:5 people (2%) had matriculation, 32 (12.8%) had intermediate education, 147 (58.8%) graduated (BA/BS), 59 (23.6) had postgraduate education (MA/MS), and 7 (2.8) possessed a doctoral degree (PhD).

In terms of socioeconomic status, 10 participants (4%) considered themselves to belong to lower, 207 (82.8%) to be middle, and 33 (13.2%) to be upper. In terms of family structure, 157 of the participants (62.8) lived in nuclear families, whereas 93 (37.2) lived in joint families.

There was also diversity in the employment status of 144 participants (57.6) and 106 participants (31.6) as employed and unemployed, respectively. Families Family size also showed some diversity, with 151 families (60.4) having 1 child, 79 families having 2 children, 18 families (7.2) having 3 children, and 2 families having 4 children.

4.2 Assessment of Normality

All the study variables were assessed by descriptive statistics and normality indices, which were cyberchondria (TCSS), health-related metacognitive beliefs (TMCQ-HA), intolerance of uncertainty (TIUS), and neuroticism (TNSS). All the variables

reported the mean values in the middle part of the scale in terms of their values, and the standard deviations reflected moderate variation in the scores among the participants.

Distributions on all scales had no troubling skewness or kurtosis. The skewness values were within a reasonable range of -1.3 to +0.126, and the kurtosis values were within the acceptable range of -1.9 to -1.79 for a large sample, hence indicating that the variables are close to a normal distribution. Minimum and maximum values represented full-scale coverage, and the interquartile ranges represented sufficient distribution of responses. On the whole, the descriptive and normality statistics allow considering the appropriateness of the variables in the following parametric tests.

TABLE 4.2: Descriptive Statistics, Skewness, Kurtosis and Kolmogorov-Smirnov Statistics for Test of Normality (N=250).

Variable	**Mean**	**Median**	**Mode**	**SD**	**Skewness**	**Kurtosis**	**K-S**	**P**
Cyberchondria	36.0	36.00	44.00	2.7	0.02	-0.94	.06	.001
Intolerance of Uncertainty	36.1	36.00	43.00	2.6	-0.2	-0.81	.04	.001
Metacognitive Beliefs	35.2	35.50	35.00	0.8	-1.2	-0.79	.05	.001
Neuroticism	35.9	35.00	43.00	0.3	.04	-0.85	.07	.001

Table 4.2 presents the descriptive statistics and normality test values of the four psychological constructs, which were measured in the research, namely Cyberchondria, Metacognitive Beliefs (Health Anxiety), Intolerance of Uncertainty, and Neuroticism, are displayed in Table 4.2. The statistics have been analyzed with respect to central tendency (mean, median), variability (standard deviation and range), shape of distribution (skew, kurtosis), and general normality.

The Cyberchondria (TCSS) scale had a standard deviation of 12.79 with a mean score of 36.02, which means that there is significant variance in the levels of cyberchondria of parents. Its distribution was almost symmetrical with a skew value of 0.02 and a kurtosis value of -0.94, which was indicative of mild platykurtosis. Comprehensively, the distribution was approximated to a normal distribution.

In the case of the Metacognitive Beliefs associated with the Health Anxiety (TMCQ-HA), the average of the score was 35.23 with a standard deviation of 10.86, which is

moderate. This value of -0.13 indicates that the skewness is a minor negative skew and the kurtosis is a minor platykurtosis value of = -0.80. These are acceptable values of normality.

According to the Intolerance of Uncertainty (TIUS) scale, the mean of the scale was 36.18, and the standard deviation was 12.67, which again indicated high levels of variability. The skew (-0.03) indicated a close to perfect distribution, whereas the value of kurtosis (-0.81) indicated a slight platykurtosis. All these indices point to a normal distribution, which is more or less normal.

The mean score of Neuroticism (TNSS) was 35.93, and the standard deviation was 10.35, which portrays that there is moderate variation in the neurotic characteristics. The skewness (-0.05) was close to zero, whereas the kurtosis (-0.85) was close to minor platykurtosis. As in the case of the other variables, the distribution was noted to be more or less normal.

On the whole, the descriptive statistics and normality indices of the four constructs were quite within the acceptable level, which confirms the normality that was assumed in the later parametric tests.

4.2.1 Histograms of Distributions

The histogram indicates that the distribution of the Cyberchondria scores is relatively symmetric and the frequencies center on the middle of the scale. The curve shows a slightly central value, which is the reason why the skewness value was calculated to be 0.02, meaning that the distribution is almost balanced. The fact that the kurtosis value is -0.94 indicates that it is a light-tailed distribution, that is, it has a flatter peak and has lighter tails than a normal distribution.

According to the distribution, the majority of scores range between 30 and 40, which means that middle positions on cyberchondria were the most popular among the participants. A low percentage of respondents recorded very high or very low, indicating a lack of extreme responses. The skew to the right is insignificant because there are some participants who have greater cyberchondria levels, and

most of the participants were concentrated at the center. In general, the bell-shaped trend shows that the distribution is rather normal, which confirms that the data were adequate to use in parametric statistical tests.

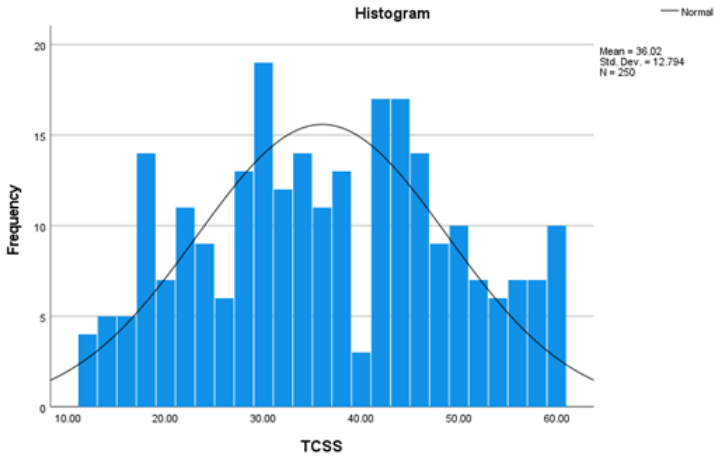

FIGURE 4.1: Distribution of scores for Cyberchondria

The figure 4.1 of the mean scores on the Cyberchondria Scale (TCSS) of 250 participants is shown in Figure 4.1. The descriptive statistics provided in the upper right-hand side of the table show that the mean of the scores is 36.02 and the standard deviation is 12.79, which is moderately large as a measure of cyberchondria and high variation among respondents.

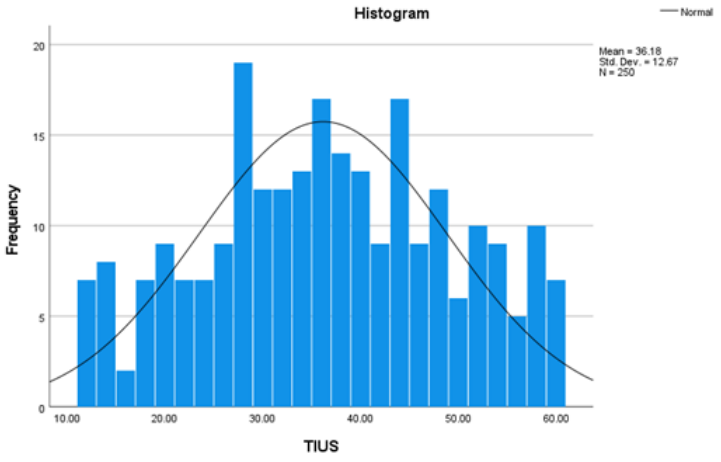

FIGURE 4.2: Histogram of the Distribution of Intolerance of Uncertainty score

Figure 4.2 shows the Intolerance of Uncertainty Scale (TIUS) scores distribution among 250 sample participants, with the mean score of 36.18 and the standard deviation of 12.67. The results in the spread of the scores tell of moderately varying

variability, meaning that the participants varied in their scores of intolerance of uncertainty.

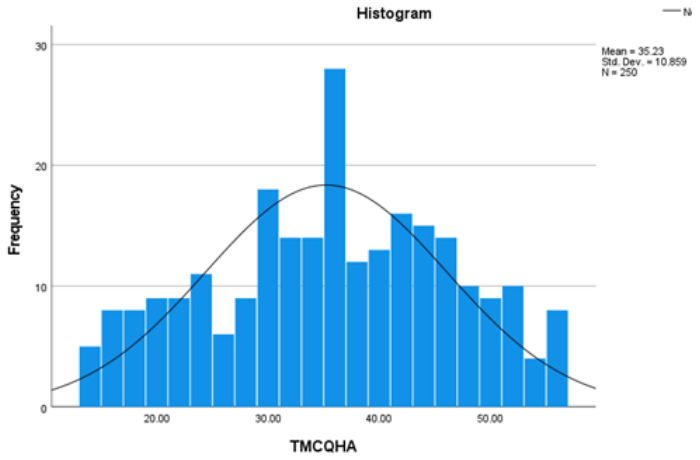

FIGURE 4.3: Histogram of Distribution of Metacognitive Beliefs scores

The distribution of Metacognitive Beliefs (TMCQHA) scores in Figure 4.3 seems to be rather symmetric, as the skewness is in the range of -0.03. The majority of the participants scored in the middle (around 35-40), and comparatively fewer gave very low and very high scores. The value of the kurtosis of -0.81 represents a slightly platykurtic distribution, which is the shape of a flatter curve with heavier tails than a normal distribution. On the whole, based on the histogram, it can be stated that the shape is rather bell-shaped, and there are no significant outliers, which confirms the assumption of normality and the suitability of parametric statistical tests.

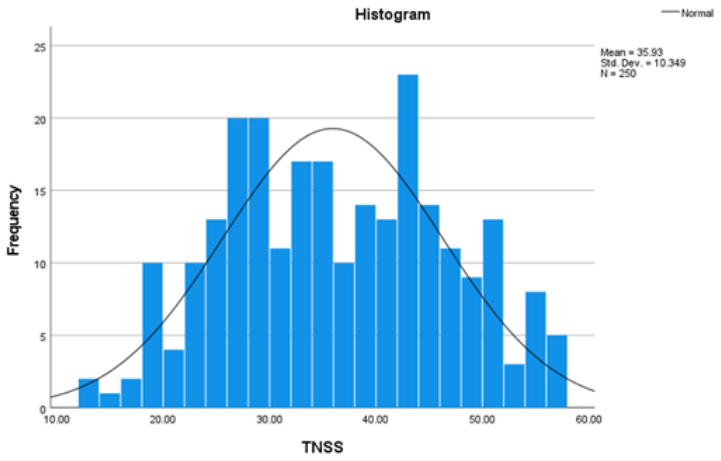

FIGURE 4.4: Figure of the Distribution of scores for the Neuroticism Scale

Figure 4.4 shows the spread of TNSS scores of the participants. The most frequent range of scores is 30-40, which implies that the great majority of the respondents felt moderate results on the TNSS measure. The distribution is more or less bell-shaped, whereby frequencies tend to be decreasing to the lower and higher sides of the scale, indicating that extreme scores were rare. The trend is that of a tendentially normal distribution with a small skewness and no significant deviations.

The histogram is characterized by a relatively symmetric distribution and a right skew, which means that very few participants had higher scores than others. Such a small departure has no significant impact on the normality of the data. Generally, the distribution is almost similar to a normal curve with moderate variation, which justifies the use of TNSS scores in the use of a parametric statistical test.

4.2.2 Reliability and Descriptive Analysis of the Measure

The Cronbach's alpha reliability coefficient of each scale was also computed to estimate the internal consistency of items in a test and provide an approximation of the internal consistency of the scale. Further, descriptive statistics were also computed based on each construct (See Table 4.3).

TABLE 4.3: Scale Reliability, Descriptive Statistics, and Distribution Characteristics

Scale	**No. of Items**	α	**M**	**SD**	**Range**		**S**	**K**
					Potential	**Actual**		
Cyberchondria Severity Scale	12	.95	36.0	12.7	1–60	12–60	0.02	-.94
Intolerance of Uncertainty Scale	12	.97	36.1	12.6	1–60	12–60	-0.02	-.81
Metacognitions Questionnaire	12	.95	35.2	10.8	1–48	14–46	-0.12	-.79
Health Anxiety Neuroticism Scale	8	.91	35.9	10.3	1–40	13–40	0.04	-.85

Note. α = Alpha reliability; M = Mean; SD = Standard Deviation; S = Skewness; K = Kurtosis

The descriptive statistics and psychometric properties of the Cyberchondria Scale, Intolerance of Uncertainty Scale, Metacognitions Questionnaire, and Neuroticism Scale are displayed in Table 4.3.

Cyberchondria Scale had a good internal consistency coefficient (alpha =.95), mean = 36.0 (SD =12.7), skew = 0.02, and kurtosis = .94. The Intolerance of Uncertainty Scale was also found to have good reliability (alpha =.97), mean = 36.1 (SD = 12.6), skewness = -0.02, and kurtosis = -0.81.

The Metacognitions Questionnaire had high reliability (α=.95), mean = 35.2 (SD = 10.8), skewness = -0.12, and kurtosis = -0.79. Lastly, the Neuroticism Scale was found to have good reliability (α =.91), mean =35.9 (SD= 10.3), skewness=0.04 and kurtosis= -0.85.

Generally, there was good reliability and about symmetrical distributions of all scales, with the slight platykurtic tendencies suggesting an intermediate variability of the sample.

4.2.3 Correlation Analysis

Table 4.4: Pearson Correlation Matrix (Two-Tailed)

Measure	**1**	**2**	**3**	**4**
Cyberchondria	–	–	–	–
Intolerance of Uncertainty	.25**	–	–	–
Metacognitive Beliefs	.25**	.34**	–	–
Neuroticism	-.08	.12	.11	–

Note. *p < .05 (significant), **p < .001 (highly significant), p > .05 (non-significant)

The Pearson correlation analysis was done to investigate the relationship between the variables of cyberchondria, metacognitive beliefs, intolerance of uncertainty, and neuroticism. Cyberchondria had significant and positive relationships with metacognitive beliefs (r = .252, p =.01) and intolerance of uncertainty (r =.253, p =.01), meaning that levels of maladaptive metacognitive beliefs, as well as the inability to tolerate uncertainty is linked to more health-related online searching. The strongest correlation between the variables was also between the metacognitive beliefs and the intolerance of uncertainty (r =.349, p <.01).

Conversely, neuroticism was neither significantly correlated with cyberchondria (r = -085) nor significantly correlated with metacognitive beliefs (r =.120) and intolerance of uncertainty (r =.112).

4.2.4 Mediation Analysis

TABLE 4.5: Mediation of Intolerance of Uncertainty in the Relationship Between Metacognitive Beliefs and Cyberchondria (N = 250)

Paths	**B**	**SE**	**LL**	**UL**	**t**	**p**
Total Effect	0.29	0.07	0.15	0.43	4.09	.000
Direct Effect	0.21	0.08	0.06	0.36	2.87	.004
Indirect Effect	0.07	0.03	0.02	0.14	–	–
MCB → IOU → CC	0.19	0.06	0.06	0.32		

Note. MCB = Metacognitive Beliefs; IOU = Intolerance of Uncertainty; CC = Cyberchondria; B = Coefficient; SE = Standard Error; t = t-statistics; CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit; p ¡ .05.

The mediation analysis performed with Model 4 of PROCESS Macro showed that the total effect of metacognitive beliefs on cyberchondria was significant (B = 0.29, SE = 0.07, t = 4.09, p <.001). The direct relationship between metacognitive beliefs and cyberchondria was still significant when intolerance of uncertainty was added to the model (B = 0.21, SE = 0.08, t = 2.87, p =.004), but its value was lower than the overall effect. The strength of the relationship between metacognitive beliefs and cyberchondria via intolerance of uncertainty was also significant (B = 0.07, SE = 0.03), and the 95 percent confidence interval was not zero [0.02, 0.14]. The comparison of the effect sizes has shown that the direct effect (B =

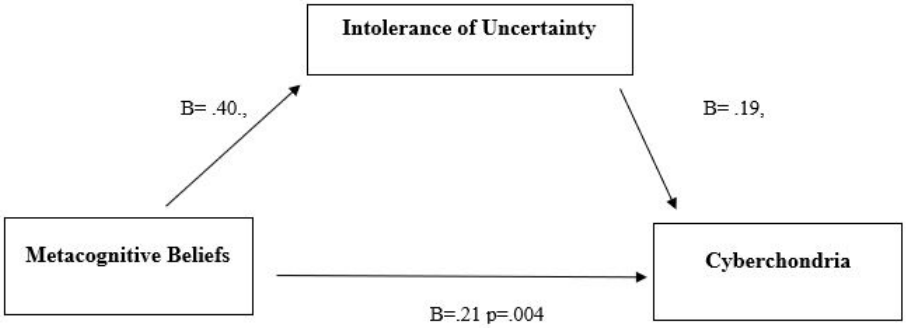

FIGURE 4.5: Mediation model indicating the effect of intolerance of uncertainty on cyberchondria through metacognitive beliefs

0.21) was greater than the indirect one (B = 0.07), indicating that although the metacognitive beliefs had a significant direct effect (B = 0.21) on cyberchondria, there is also a significant part of the A relationship that goes through intolerance of uncertainty. This trend in favor of the existence of partial mediation, which points

to intolerance of uncertainty as a cause of all but some portion of the relationship between metacognitive beliefs and cyberchondria.

4.2.5 Moderation Analysis

The moderation analysis was done using Model 1 from Hayes' Process Macro to examine the moderating role of neuroticism on cyberchondria. The table depicts

TABLE 4.6: Moderating Role of Neuroticism in the Relationship Between Metacognitive Beliefs and Cyberchondria (N = 250)

Variables	**B**	**SE**	**t**	**p**	**LL**	**UL**
CB	5.90	0.78	5.68	.000	34.35	37.45
SS	0.32	0.07	4.41	.000	0.18	0.47
M	0.15	0.08	2.04	.040	-0.31	-0.006
R^2	0.08	0.07	1.14	.250	-0.006	0.02
F	0.28					
R^2	0.08					
ΔR^2	0.005					
F	7.29					
ΔF	1.29					
p (Model)	.000					

Note. MCB = Metacognitive Beliefs; NSS = Neuroticism Scale; CC = Cyberchondria; B = Unstandardized Coefficient; SE = Standard Error; t = t-statistic; LL = Lower Limit; UL = Upper Limit; p ¡ .05.

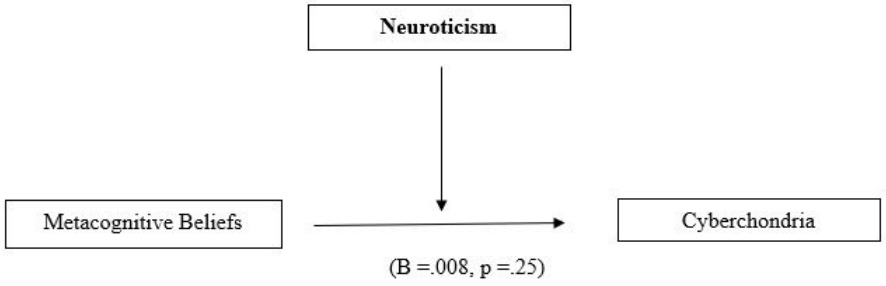

FIGURE 4.6: The moderating effect of neuroticism in the relationship between metacognitive beliefs and cyberchondria.

a moderating role of neuroticism in the relationship between the metacognitive beliefs and cyberchondria. The interaction term was not found to be significant (B =.008, p=.25), and it indicates that neuroticism is not a significant modulator of the relationship between metacognitive beliefs and cyberchondria. The total model explains 8 percent of the variance in cyberchondria (R 2 =.08), and the

addition of the interaction term does not provide significant changes to the variance accounted by the model (R 2 =.005, F 2 =1.29, p >.05). Figure 4.6 illustrates the moderating effect of neuroticism in the relationship between metacognitive beliefs and cyberchondria.

4.2.6 Independent Sample T-test

TABLE 4.7: Mean Differences of Demographic Variables

Variable	Levene's F	p	t	df	p (2-tailed)	Mean Difference	95% CI LL	95% CI UL
Cyberchondria (TCSS)	1.013	.315	−0.65	248	.515	−1.20	−4.84	2.43
Metacognitive Beliefs (TMCQHA)	0.121	.729	−0.45	248	.653	−0.71	−3.79	2.38
Intolerance of Uncertainty (TIUS)	0.538	.464	1.47	248	.144	2.67	−0.92	6.26
Neuroticism (TNSS)	0.367	.545	−0.40	248	.690	−0.60	−3.54	2.35

Gender differences in cyberchondria, metacognitive beliefs, uncertainty intolerance, and neuroticism were tested using an independent samples t -test of cyberchondria, metacognitive beliefs, and uncertainty intolerance between male (n = 65) and female participants (n = 185). There were no significant differences in gender on all four variables. Males (M = 36.9, SD = 10.9) and females (M = 35.7, SD = 12.5) had similar scores, t = -0.62, p =.31 having a small effect size (d = 0.12). On the same note, the metacognitive belief was not significantly different between males (M = 35.7, SD = 10.7) and females (M = 35.0, SD = 10.9), t = -0.45, p =. 72, d = 0.10.

There was also no significant gender difference in terms of intolerance of uncertainty, as males (M = 34.2, SD = 36.8) and females (M = 36.8, SD = 12.9) had the same level of intolerance, t = 1.40, p =.46, d = 0.12. Similarly, the difference between the male (M = 36.3, SD = 9.96) and female (M = 35.7, SD = 10.5) neuroticism scores were insignificant, t = -0.40, p =.54, d=0.10. In general, there were small effect sizes in all the variables, which means that there is a non-significant practical difference between genders.

4.3 Summary of Findings

The current research paper has investigated the connections among cyberchondria, intolerance of uncertainty, metacognitive beliefs, and neuroticism in parents of children with neurodevelopmental disorders. In general, the results indicate that cyberchondria is significantly related to maladaptive metacognitive beliefs and uncertainty tolerance problems. Parents who searched more about their health online were more likely to have unproductive beliefs regarding their thoughts, and also when presented with ambiguous health outcomes, they were more likely to develop discomfort. These cognitive vulnerability issues were found to support each other, thus indicating their synergistic contribution towards health-anxious behavior. Neuroticism, on the other hand, failed to show any meaningful or significant relationship with cyberchondria or with the other constructs measured, indicating that emotional instability by itself is not a complete explanation of excessive online health-seeking in this group. The statistics also showed that the data of all scales employed in the research were very reliable, and distributions of key variables were close to normal, which substantiates the strength of the analyses.

Chapter 5

Discussion

The current paper has explored the complicated interplay between cyberchondria, intolerance of uncertainty, metacognitive beliefs, and neuroticism in parents having children with neurodevelopmental disorders, to understand the cognitive and emotional processes that underlie excessive health-related information seeking. In line with empirical findings, intolerance of uncertainty and maladaptive metacognitive beliefs are cognitive vulnerabilities that are considerably related to cyberchondria. To illustrate, greater intolerance of uncertainty has been associated with more symptoms of cyberchondria, which proves that people who experience the distress caused by uncertainty are more likely to conduct more frequent health-related online searches as a maladaptive strategy of dealing with uncertainty (Gu et al., 2025; Nadeem et al., 2022). It is also known that meta-cognitive beliefs regarding the inability to control thoughts, biased thinking, and related constructs are significant predictors of cyberchondria, even when they control such constructs (Nadeem et al., 2022; Fergus & Spada, 2017). The relationship of neuroticism and cyberchondria through the mediating role of intolerance of uncertainty and health-related metacognitive beliefs also demonstrated that cognitive variables are critical in addition to personality traits that are consistent (Torabi & Pourmohammad, 2025). In addition, there is also some evidence suggesting that demographic factors like gender can produce insignificant effects on these relationships when cognitive predictors are used (e.g., large cross-sectional community data). Collectively, these results support the idea that cyberchondria in parenting cannot be

viewed as an emotional response or habit, but rather a cognitive process of struggling with uncertainty and maladaptive metacognitive assumptions of uncertainty in the context of stress and caregiving uncertainty.

5.1 Hypothesis 1

Hypothesis 1 was as follows: It is assumed that the relationship between metacognitive beliefs, intolerance of uncertainty, neuroticism, and cyberchondria is significant. The results of the current research partly confirmed the hypothesis and demonstrated the significant association between cyberchondria, metacognitive beliefs, and the intolerance of uncertainty, but neuroticism was not significantly correlated in the context of the current sample.

The strong positive relationship between cyberchondria and metacognitive beliefs supports the previous fact that maladaptive beliefs about thinking are central to health-related anxiety and obsessive online searching. They concluded that the quality of parent-child interactions, as well as the metacognitive beliefs of mothers, were important predictors of parental self-efficacy. This observation is quite similar to what Torabi & Pourmohammad (2025) reported because they established that metacognitive beliefs were the ones that strongly predicted cyberchondria as well as mediated the relationship between neuroticism and cyberchondria. Their research revealed that more potent maladaptive metacognitive beliefs enhanced the route between personality vulnerabilities and excessive online health-seeking of information. Contrary to their findings, the present research had no significant direct correlation of neuroticism and cyberchondria, indicating that personality factors alone do not indicate predictability of cyberchondria unless they are combined with certain cognitive weaknesses. Although prior studies have attributed the state of having high levels of neuroticism to having high levels of health anxiety and excessive information seeking concerning health, it usually turns out that these associations are mediated not by personality traits but by maladaptive intellectual processes (McElroy & Shevlin, 2014; Fergus & Dolan, 2014).

The other important result of the current study was that there was a strong positive relationship between cyberchondria and the intolerance of uncertainty. This

observation is consistent with the accumulating evidence that people with a low tolerance to uncertainty or unpredictability tend to get into repetitive health-related searches in an attempt to deal with the state of uncertainty (Carleton, 2016; Starcevic & Berle, 2013). Nevertheless, these searches often do not alleviate anxiety but instead mitigate it. The high correlation found during this study is similar to the works of Torabi & Pourmohammad (2025), who discovered that the correlation between neuroticism and cyberchondria was mediated by the intolerance of uncertainty, as well as Amanak & Şule Bilgiç (2025), who concluded that intolerance to uncertainty was significantly enhanced by cyberchondria among pregnant women. Collectively, the results show intolerance of uncertainty as a key, cross-population cognitive risk factor that reliably correlates with excessive health-related searching behaviors.

The correlation between metacognitive beliefs and intolerance of uncertainty had the strongest association of the relationships in the current research. This implies that people having more maladaptive beliefs regarding their thinking processes are also more apt to be distressed by unpredictable situations. This relation is consistent theoretically with metacognitive models, whereby negative beliefs about thinking contribute to an increased perceived danger of uncertainty to make people more susceptible to reassurance-seeking. The latter are also supported by a study by Altungy et al. (2025), which found that intolerance of uncertainty is a closely related trait to neuroticism and other personality variables, and that it plays a central role in explaining why personality variables relate to outcomes of anxiety. Their results also revealed that metacognition was not significantly related to general personality dimensions, and so it might be a distinct cognitive process and not a personality-directed tendency. This is congruent with the findings of the current study, in which metacognitive beliefs and intolerance of uncertainty had a strong relationship with cyberchondria, but not neuroticism.

Unlike in the past research, where the study found a significant positive relationship between neuroticism and cyberchondria, in the current research, no direct relationship was observed between the two variables. The past studies have indicated that emotionally highly reactive and negatively affective persons tend to engage in over-searching online health-related information more often because of

their high neuroticism (Fergus & Russell, 2016; McMullan et al., 2019). But discrepancies in studies could be explained by variation in the aspects of samples, culture, and baseline of emotional instability, which could lead to variations in the manifestation of the personality traits in the health behaviors. New data reveal that cognitive weaknesses may become a more central factor in the development of cyberchondria than narrow personality characteristics (Starcevic et al., 2019; Fergus & Dolan, 2014). Additionally, the effect of neuroticism can be indirectly realized via the mediation process, such as anxiety sensitivity, health anxiety, metacognitive beliefs, and intolerance of uncertainty, but not directly (Fergus & Spada, 2017; Norr et al., 2015). This understanding aligns with the evidence-based findings that indicate that cognitive and metacognitive processes are the primary reason why neurotic individuals are susceptible to maladaptive behavior, especially in the light of uncertainty in the health context and seeking information online (Starcevic & Berle, 2013; Fergus & Russell, 2016).

All in all, the results of the current research demonstrate the predominance of cognitive processes, in particular, metacognitive beliefs and intolerance of uncertainty, over personality factors in the prediction of cyberchondria. Although neuroticism is widely discussed in the previous literature as one of the vital vulnerabilities, the present findings can indicate that personality factors may not be adequate in the explanation of excessive online health-searching, except in the context of dysfunctional interpretations of uncertainty and problems in its management. In this way, the hypothesis is partly valid, and the evidence concerning cognitive correlates is strong, while the evidence of personality-related correlates is weak.

5.2 Hypothesis 2

The second hypothesis was that intolerance of uncertainty (IU) conditionally mediates the association between metacognitive beliefs and cyberchondria. This hypothesis was confirmed by the results of the mediation analysis. The overall impact of metacognitive beliefs on cyberchondria was also substantial, which implies that people who support more powerful maladaptive metacognitive beliefs, including the perception of thoughts as harmful, uncontrollable, and reflective of

actual health risks, are likely to report greater levels of excessive internet searching related to health. The direct influence was strong despite the consideration of IU, which indicates that the influence of metacognitive beliefs on cyberchondria is independent. Concurrently, the indirect effect via IU was significant, which affirmed a partial mediation. This implies that intolerance of uncertainty has a significant role to play in how and why metacognition beliefs turn into cyberchondria, yet metacognitions also play an independent role. Such results are in line with the metacognitive model of health anxiety that maladaptive metacognitive beliefs are the cause of persistent worry, self-monitoring, and reassurance seeking (Wells, 2011). Patients who are convinced that their thoughts about their illness are threatening or uncontrollable have higher chances of being distressed when confronted with uncertainty in their illnesses. Consequently, they will resort to online searching repeatedly to alleviate doubt, even though online searching will only contribute to anxiety and enjoy the maladaptive loops (Xie et al., 2023). In such a way, the current findings are the direct indication that metacognitive beliefs serve as a cognitive risk factor, whereas the intolerance of uncertainty is an emotional enhancer, both of which increase the cyberchondria levels.

These results support previous literature that names IU and metacognition beliefs as the primary constructs in explaining cyberchondria. In a case in point, the results of a study conducted by Torabi & Pourmohammad (2025) revealed that both metacognitive beliefs and intolerance of uncertainty mediated the association between neuroticism and cyberchondria. It has been established before that neurotic people are at a higher risk of having low levels of neuroticism, intolerance of uncertainty (IU), and maladaptive metacognitive beliefs that further predispose them to become cyberchondria due to the amplification of distress when faced with ambiguous health news (Fergus & Spada, 2017; Norr et al., 2015). Even though the current research study involved metacognitive beliefs as the key predictor instead of neuroticism, the conceptual similarity of the proposed mechanism is evident. In particular, inflexible and dysfunctional ideas concerning the importance and manageability of thoughts can enhance the perceived uncertainty, where individuals undertake excessive searching on the Internet related to health as a maladaptive coping behavior (Starcevic et al., 2019). The intolerance of uncertainty mediating

effect found in the literature indicates that the inability to tolerate ambiguity is not merely a trans diagnostic process but a fundamental aspect of cyberchondria, in any case, whether the vulnerability is shaped by more general personality characteristics or more proximal cognitive-metacognitive mechanisms (Carleton, 2016; McMullan et al., 2019).

The close association between intolerance of uncertainty (IU) and cyberchondria is also corroborated by the evidence that IU might also be used as an indirect predictor and not be a direct predictor. Empirical research has indicated that IU leads to cyberchondria by being linked to anxiety-related constructs, including health anxiety and negative affect, thus the enhancement of maladaptive online health seeking. Specifically, the increased anxiety is correlated with the increased intolerance of uncertainty, which is in turn correlated with the severity of cyberchondriac levels. The results are in line with the current findings that imply that even though some primary predictors, i.e., maladaptive metacognitive beliefs or social anxiety, might be independent of each other, intolerance of uncertainty is an important psychological mediator between anxious cognitions and compulsive online health-related searching. Taken altogether, this fact can serve as evidence of the clinical significance of IU-based interventions in alleviating the severity of cyberchondria (Fergus & Dolan, 2014; Bajcar & Babiak, 2020; Jungmann & Witthöft, 2020).

On top of the factors of cognitive vulnerability, the emotional and health-related outcomes of cyberchondria identified in the current research align with the results obtained on older participants. (Yang et al., 2025) showed that cyberchondria had significant predictive effects on cognitive fusion, which in its turn decreased health-related quality of life and mental well-being among older Chinese adults. Their mediation model had demonstrated that cognitive fusion was a complete description of the association between cyberchondria and diminished well-being. Taken together with the existing outcomes, these results indicate that the existence of cyberchondria is supported by more than just cognitive processes, including IU and maladaptive beliefs, but also by such processes as fusion with distressing thoughts, which implies a multi-component pathway. On the whole, convergence in these studies highlights the fact that cyberchondria emerges and maintains itself as a result of a complex interplay of maladaptive metacognitions, lack of coping with

the uncertainty, and inflexibility of thought-behavioural patterns. The mediation findings of the present study effectively fit into this new framework, and it was established that intolerance of uncertainty is an extremely important process that correlates with maladaptive beliefs and excessive Internet searching.

5.3 Hypothesis 3

The third hypothesis was that neuroticism would mediate the relationship between metacognitive beliefs and cyberchondria, in that individuals with greater neurotic traits would be affected more by the maladaptive metacognitive beliefs on cyberchondria (Nasiri et al., 2023). However, unlike this expectation, the results of the current research have shown that the moderation effect was statistically non-significant, meaning that neuroticism does not have a significant impact or reinforce the correlation between metacognitive beliefs and cyberchondria. The interaction term was not significant, and the overall model could only explain a minor percentage of the variance, with the inclusion of the interaction term not making a significant difference. This implies that the effect of metacognitive beliefs on cyberchondria has not changed much, irrespective of the neuroticism of an individual.

These results form a fascinating contrast of the hypotheses of the theory and certain previous conceptualizations. Neuroticism is generally viewed in terms of emotional instability, negative affect, increased worry, and sensitivity to stress factors that are closely correlated with the patterns of excessive health information search and the rumination of anxiety. In theory, the neurotic individuals were supposed to be more likely to exaggerate cognitive distortions and to overindulge in reassurance-seeking behaviors, which are the main characteristics of cyberchondria (McMullan et al., 2019; Nasiri et al., 2023; Starcevic et al., 2019). Nonetheless, the current findings prove that neuroticism is definitely a vulnerability factor, but it might not directly interrelate with the metacognitive processes in creating cyberchondria.

The latest sources confirm this concept, pointing to the fact that the notion of cyberchondria is better explained by the cognitive processes and seeking information

patterns instead of demographic or personality characteristics (McMullan et al., 2019). Hussain et al. (2025) established that demographic factors such as gender and age, household income, education, relationship status, and residential background did not play any significant role in predicting cyberchondria among young adults. Their results also revealed that psychological susceptibilities to anxiety and cognitive-behavioral factors are more influential in cyberchondria as opposed to consistent personal traits or sociodemographic factors. This is analogous to the current findings, which indicate that neuroticism, although a general tendency to worry, may not have a great influence on the association between metacognition and cyberchondria.

Furthermore, results of the studies on elderly people also point to the focus of metacognition processes and not the personality. Gu et al. (2025) showed that cyberchondria is a mediator between positive metacognition, health self-efficacy, and health information avoidance. Their research also emphasized that metacognitive beliefs directly and indirectly influenced them, but some other external or dispositional variables (e.g., subjective norms) did not influence them significantly. The findings indicate that the processes that support cyberchondria are more cognitive and self-regulatory, but not personality-oriented. This also indicates the interpretation in the present study that neuroticism as an extensive and consistent personality dimension might not be a situational magnifier in the metacognition-cyberchondria interaction. The other reason that can be attributed is the strength and particularity of the predictors. Special cognitive constructions are metacognitive beliefs, which are associated with the regulation of thoughts, uncontrollability, and perceptions of danger and beliefs in the usefulness of worry. These domain-specific cognitive functions could directly affect cyberchondria to the extent of dominating world personality inclinations (Nasiri et al., 2023). Cyberchondria is associated with excessive reassurance-seeking to find ambiguous information about their health, inaccurate interpretation, which is better understood as a symptom of maladaptive malecognitive beliefs instead of being a symptom of overall emotional imbalance (Fergus & Dolan, 2014; Haberkamp et al., 2021).

Moreover, the research has shown that different people with different degrees of neuroticism could also become excessively involved in searching health-related

information online, as they could have maladaptive metacognitive beliefs or be highly intolerant of uncertainty (Torabi & Pourmohammad, 2025). The results of the present study, along with those of Hussain et al. (2025), imply that cyberchondria is not being influenced significantly by personality traits but rather is based on self-centered cognitive processes, health anxiety, and maladaptive coping patterns. This will change the approach of vulnerability being personality-based to the more malleable and responsive cognitive-behavioral vulnerability approach to therapeutic intervention. On the whole, the fact that neuroticism does not have a substantial modulating effect highlights that cyberchondria can be best conceptualized using a metacognitive framework, in which dysfunctional beliefs and challenges with uncertainty management are more influential. These conclusions emphasize the need to focus on the cognitive and metacognitive processes, rather than personality characteristics, in assessment, prevention, and treatment interventions.

5.4 Hypothesis 4

The current research aimed to test the hypothesis that demographic differences, especially gender, were linked to the differences in metacognitive beliefs, intolerance of uncertainty (IU), neuroticism, and cyberchondria. But the results showed that there were no significant gender differences on any of these psychological constructs. This trend aligns with the existing literature that has found little or no gender effects of cyberchondria and associated cognitive vulnerabilities, indicating that overindulgent searching on the Internet in relation to health is not particularly gender-based (McElroy & Shevlin, 2014; Starcevic & Berle, 2013). Likewise, the studies focusing on metacognitive beliefs and IU have produced similar results in both males and females, which suggests that the cognitive-emotional processes can serve as transdiagnostic vulnerabilities but not demographic-specific characteristics (Carleton, 2016; Schmitt et al., 2008). In addition, the results of the study of personality imply that despite some reports of little gender variation in neuroticism, such a variation is not always reflected in the different maladaptive health-related behaviors (Schmitt et al., 2008). Taken together, these results

indicate that the underlying psychological processes dominate in promoting cyberchondria and its cognitive and emotional correlates more than the demographic factors like gender.

The business that cyberchondria does not vary significantly by gender is similar to Hussain et al. (2025), who also establish that demographic characteristics such as gender were not important predictors of cyberchondria in their large sample of adults. Similar to the present research, they have also observed that cyberchondria appears to be rather a cognitive-behavioral response pattern that is more correlated to the psycho logical variables, rather than a demographic one. It has also been indicated that the gender disparity in cyberchondria is not very large or irregular in most cases. Empirical reports have recorded either insignificant sex difference or lack of any meaningful variation based on gender in the severity of cyberchondria, showing that there is excessive searching of health information in both male and female sexes. These results confirm the opinion that more significant roles in cyberchondria play internal cognitive and emotional processes rather than such demographic factors as gender (Jungmann & Witthöft, 2020; Haberkamp et al., 2021).

Equally, studies show the presence of minimal or no gender difference in maladaptive metacognitive beliefs. Past researches have shown that the core metacognitive biases, including the uncontrollability or danger of worry beliefs, are general cognitive processes that are not much gender-specific (Wells & Cartwright-Hatton, 2004; Fergus & Spada, 2017). Even though the sexes differ in anxiety symptoms being higher among women, there is evidence that there are no significant differences in the metacognitive structures underlying the experience of anxiety and health related worry between the sex.

True to this trend, intolerance of uncertainty (IU) has been found to also operate as a transdiagnostic cognitive vulnerability as opposed to a gender-specific trait. The studies show that although females might be more anxious in high-IU settings, IU itself is not significantly different based on gender and work the same in both young and old age groups (Dindo et al., 2012; Minns et al., 2019). Similarly, the results concerning neuroticism indicate that even though women could have more emotional distress, the structural interactions involving neuroticism, anxiety

sensitivity, and intolerance of uncertainty do not differ between genders (Bajcar & Babiak, 2020).

When combined, these results indicate that demographic variables like sex are relatively insignificant as far as the psychological processes of cyberchondria are concerned. Rather, internal cognitive-emotional weaknesses seem to be the primary causes of cyberchondria, maladaptive metacognitive beliefs, intolerance of uncertainty, and neuroticism. This trend is congruent with dimensional and transdiagnostic models, including the Research Domain Criteria (RDoC) and the Triple Vulnerability Model, which focus less on demographic differences and more on the underlying psychological mechanisms to explain psychopathology (Barlow, 2003; Sanislow, 2010).

Intervention should therefore be more effective when the strategies are directed towards the change of maladaptive malacognitive beliefs and intolerance to uncertainty instead of the demographic subgroups. The present paper has reviewed the complex psychological processes that are involved in cyberchondria with a specific focus on metacognitive beliefs, intolerance of uncertainty (IU), and neuroticism. According to the results, maladaptive metacognitive beliefs were the most important predictors of cyberchondria, which confirmed the large body of literature that dysfunctional beliefs toward thinking (including beliefs about the uncontrollability and threat posed by thoughts, the heightened responsibility to avoid harm, and the perceived need to reassure) are central to excessive online health-related searching (Wells, 2011; Fergus & Spada, 2017; Starcevic & Berle, 2013). These are the same findings as those of the metacognitive models which suggest that these beliefs enhance monitoring of threats and wearing maladaptive coping mechanisms, such as checking symptoms repeatedly and seeking reassurance through online resources (Fergus & Dolan, 2014).

Besides, intolerance of uncertainty was found to be an important partial mediator, which means that individuals who undergo high levels of distress at the time of ambiguity stand a higher chance of converting maladaptive metacognitive assumptions into maladaptive, excessive online health information-seeking behaviors. This also corresponds with previous data that IU escalates anxiety-related thinking, encourages information-seeking as an emotion-management technique,

and maintains repetitive checking behaviors in the face of perceived health threats (Dugas et al., 1998; Carleton, 2016; Norr et al., 2015; McMullan et al., 2019). It has been demonstrated repeatedly that IU adds to the elevated vigilance to bodily sensations and makes people more dependent on external sources of certainty, which only supports the behaviors associated with cyberchondria (Fergus & Russell, 2016; Starcevic et al., 2019).

However, unlike the theoretical predictions as well as certain past research results, neuroticism did not prove to be an important mediator or moderator in the correlation between metacognitive beliefs and cyberchondria in the current sample. In spite of the prevalent correlations of neuroticism with emotional responsiveness and reactivity, negative affectivity, and worry-prone cognitive functioning (Lahey, 2009; Costa & McCrae, 1992), these associations did not translate into a significant indirect or interactive effect within the current model.the lack of significance in this effect indicates that neuroticism could have a more remote or indirect impact, instead of influencing the functioning of metacognitive beliefs in the development of cyberchondria (Fergus & Spada, 2017; Starcevic & Berle, 2013). This observation is consistent with the emerging views that put forward the idea that proximal cognitive and metacognitive processes are more determinants of cyberchondria than broad personality traits (Wells, 2011; McMullan et al., 2019).

Collectively, the findings suggest that internal cognitive processes particularly maladaptive metacognitive beliefs and intolerance of uncertainty, play a more central role in the development and persistence of cyberchondria than previously recognized, whereas personality traits like neuroticism appear less influential. This supports transdiagnostic and metacognitive models that prioritize modifiable cognitive processes over stable personality traits in explaining maladaptive health-related behaviors.

5.5 Theoretical Implications

The results provide valuable input into the current psychological theories of understanding cyberchondria and processes of anxiety. To begin with, the meaningful interconnections between cyberchondria and intolerance of uncertainty with

metacognitive beliefs are consistent with the cognitive-behavioral and metacognitive theories, which highlight the importance of maladaptive cognitions in perpetuating reassurance-seeking attitudes (Starcevic & Berle, 2013). The findings confirm the hypothesis that cyberchondria is not just a behavioral habit, but a cognitive process that depends on the manner in which people perceive uncertainty and internal thoughts (Nadeem et al., 2022; Fergus & Spada, 2017). The close associations between intolerance of uncertainty and metacognitive beliefs also support the existence of theoretical models that state that rigid or catastrophic thinking styles make a person more prone to the information-seeking behaviors driven by anxiety (Torabi & Pourmohammad, 2025). The finding of non-association with neuroticism refutes the hypothesis that personality traits are the principal causes of cyberchondria, and instead, theoretical emphasis has to be placed on cognitive processes instead of dispositional emotionality (Satici et al., 2022). Such a difference can be used to narrow down conceptualizations by pointing out the fact that cyberchondria might be more cognitive-specific than personality-based.

5.6 Practical Implications

The results provide valuable insights into the available psychological paradigms of cyberchondria and processes involving anxiety. First, the high correlations between cyberchondria, intolerance to uncertainty, and metacognitive beliefs are consistent with cognitive-behavioral and metacognitive models, which highlight the importance of maladaptive cognitions in the sustenance of reassurance-seeking processes (Starcevic & Berle, 2013). The findings confirm the hypothesis that cyberchondria is not just a behavioral habit, but a cognitive process that depends on the way people view uncertainty and their internal mental processes (Nadeem et al., 2022; Fergus & Spada, 2017). The close connection between metacognitive beliefs and intolerance of uncertainty also supports theoretical theories that explain that the rigid or catastrophic thinking styles make them more vulnerable to anxiety-related information seeking (Torabi & Pourmohammad, 2025). It is not associated with neuroticism, which contradicts the assumptions that personality traits are the

main drivers of cyberchondria and theoretical focus should be on cognitive processes instead of dispositional emotionality (Satici et al., 2022). This differentiation assists in narrowing conceptual models by emphasizing the fact that cyberchondria can be more cognitive-focused as opposed to being personality-focused.

5.7 Limitations and Future Directions

The study has a number of limitations in spite of these contributions. Self-report measures were used to gather the data, and such data collection methods may be prone to response bias, such as social desirability or understanding of the questions. The sample was mainly composed of parents who are already linked to services related to neurodevelopmental disorders, and this makes the sample incapable of being generalized to larger populations. The findings may also be affected by the unequal distribution of the demographic variables, especially gender, thus affecting the extent of representativeness. The cross-sectional design also makes it impossible to make any conclusions regarding causality; in other words, the direction of the effect between variables cannot be strictly determined.

The longitudinal designs should also be regarded in future studies with an aim of achieving causal directions among cyberchondria, intolerance of uncertainty, and metacognitive processes. The addition of qualitative aspects could give more information about caregiver experiences. The generalizability would also be enhanced with an expanded sample to cover more socioeconomic and cultural groups. The other possible predictors that can be addressed in future research include digital literacy, the style of coping, and the stress of the caregiver to be able to offer a better picture of cyberchondria among the caregiving populations.

5.8 Summary

The current research examined the interconnection between cyberchondria, uncertainty intolerance, beliefs in metacognition, and neuroticism in the case of the parents of children with neurodevelopmental disorders. The rationale of the study

was to examine the role of cognitive, emotional, and personality-related factors in excessive health-related online searching behavior. When combined, these results demonstrate a specific pattern of psychological interactions, which place the primary focus on cognition and not personality alone, in influencing cyberchondria among this population group.

The main results of the research were the high and stable relationship between cyberchondria and cognitive mechanisms, especially maladaptive metacognitive beliefs and uncertainty tolerance problems. Parents who use the internet searching of information about health as a common practice promote some of the unhelpful beliefs regarding their thoughts, which include the notion that their thoughts are uncontrollable, dangerous, or have to be constantly monitored. Such people were as well prone to the increased feeling of distress in cases of ambiguity, unpredictability, or uncertainty, particularly those pertaining to the health of their child. This implies that in times of doubt about the symptoms or vague medical counsel, parents may turn to online searching to provide them with a sense of security, though this may only lead to further anxiety and misunderstanding.

The researchers also discovered that metacognitive beliefs and intolerance of uncertainty had a close relationship with one another. This means that those people who are inflexible, negative, or rigid in their thoughts about their thinking processes are also more inclined to be unable to manage uncertainty in general. The unclear health circumstances may be perceived by these parents as threatening or overwhelming, and they may even engage in more and more efforts to seek clarity on the internet. That is, it seems that cyberchondria is not only perpetuated by the necessity to be reassured but also the manner in which people assess their own thinking and deal with the unknown (McMullan et al., 2019).

This research indicates that cyberchondria can be explained using cognitive models as opposed to dispositional factors in personality. Such a difference matters since it suggests that interventions aimed at the reduction of cyberchondria might be more beneficial when they concentrate on cognitive restructuring, intolerance of uncertainty, and change in metacognitive beliefs instead of the personality traits. The other significant element of the findings is associated with gender differences.

The outcomes indicated that male and female parents did not have any significant differences in any of the variables measured. The reported cyberchondria, intolerance of uncertainty, metacognitive beliefs, and neuroticism were similar in both genders. This raises the possibility that gender is not an important factor in the development of these psychological dispositions towards parents of children with neurodevelopmental disorders. This study consequently furnishes proof that in the environment of caregiving, mothers and fathers are equally prone to mental patterns that propagate cyberchondria.

The reliability test of the scales showed good internal consistency of all measures utilized in the study. This justifies the validity of these findings and justifies the appropriateness of the tools applied in the process. Also, the t-test distribution of variables showed that the data were good enough to be interpreted and analyzed statistically. The combination of all these methodological strengths leads to a stronger trust in the results.

In general, the results show that cognitive vulnerabilities, in particular, intolerance of uncertainty and dysfunctional metacognitive beliefs, are a primary determinant of cyberchondria among parents of children with neurodevelopmental disorders. Instead of being a result of stable personality factors or demographic influences, cyberchondria seems to be a consequence of particular thought patterns leading to the way parents perceive health-related information and the presence of ambiguity and how they deal with emotional discomfort. The findings are important to the body of knowledge as they shed light on the psychological processes that underlie cyberchondria among the population of caregivers. They also underline the necessity of specific interventions that should consider cognitive stressors among parents who have to manage complicated health conditions. Knowledge of such patterns enables clinicians and educators to develop more effective support systems to assist the families in dealing with neurodevelopmental issues.

Chapter 6

Conclusion

The current research paper involves a detailed discussion of the psychological issues that explain cyberchondria in the parents of children with neurodevelopmental disorders. The study provides a comprehensive perspective of how the relationship between health-related anxiety is formed and maintained in already highly stressed caregiving individuals through the analysis of cognitive factors, emotional processes, and variables of personality. In its findings, the authors draw various general conclusions that are both methodological, theoretical, and practical.

First, the current research project suggests that cyberchondria is rather a cognitive phenomenon. Cyberchondria seems to be perpetuated by the presence of maladaptive cognition, especially extreme metacognition beliefs and exaggerated uncertainty intolerance. This explanation is in line with the metacognitive theory, where beliefs about the self-identity of thoughts, including the feeling of uncontrollability, danger, or risk of harm, are central to the perpetuation of distress, which is more often the case than the content of the thoughts itself (Wells, 2011; Fergus & Spada, 2017). The parents who perceive their thoughts as dangerous or something they cannot control can thus develop greater levels of uncertainty and ambiguity in their thoughts leading to excessive use of online health information in their quest to reduce anxiety. Such reassurance-seeking behavior is paradoxically likely to increase fear and confusion and, therefore, preserve cyberchondria (Haberkamp et al., 2021).

Second, the results emphasize the fact of intolerance of uncertainty as one of the constructs that affect health-related anxiety among caregivers. The unpredictability of medical, behavioral, and developmental issues with a neurodevelopmental disorder may often place caregivers in situations where they are at a high risk of distress when faced with uncertainty, which is not well tolerated (Hayes & Watson, 2013). The current findings indicate that the inability to cope with ambiguity makes caregivers more susceptible to cyberchondria, which underscores the significance of developing psychological flexibility, which refers to the ability to be effective despite the uncertainty Kashdan & Rottenberg (2010).

Notably, neuroticism was not found as a major predictor of cyberchondria among this group of caregivers. The current results indicate that situational stressors and cognitive interpretations of uncertainty may have a stronger impact on neuroticism in parents of children with neurodevelopmental disorders than stable personality traits (also, despite the extensive past relationship of neuroticism with anxiety, health concerns, and negative affectivity) (Lahey, 2009; Costa & McCrae, 1992). This difference has significant clinical consequences, being aligned with the tendency to emphasize changeable cognitive mechanisms rather than focusing on trait-oriented intervention.

Besides this, the research did not detect any gender difference in cyberchondria, metacognitive beliefs, and intolerance of uncertainty, and emotional reactivity. This is consistent with the past studies showing that these cognitive factors are common in sexes and better explained as transdiagnostic mechanisms than as gender-specific disposition (Fergus & Spada, 2017; Minns et al., 2019). These results are provocative to the stereotypical beliefs about gendered responses to anxiety and indicate that cognitive pressures that come with care giving have similar impacts on mothers and fathers.

The other conclusion that is important is interdependence of cognitive vulnerabilities. The independent variable of metacognitive beliefs and intolerance of uncertainty did not exist in isolation but instead, they seem to support each other in the context of a larger cognitive system influencing caregivers in their interpretations of health-related information and their reactions to perceived threats. This helps justify transdiagnostic approaches that focus on interacting cognitive processes

and indicate that a multi-domain approach to interventions can be more effective than one-focused interventions (Dindo et al., 2012; Fergus & Spada, 2017).

Moreover, the results indicate the psychological peculiar burden of parents whose children have neurodevelopmental disorders. Continuous care giving stress, recurrent exposure to ambiguity, and wanting to safety their child can make online information about health search an appealing albeit maladaptive coping strategy (Hayes & Watson, 2013). Alternatively to the discouragement of the online searching, medical workers can be more helpful to caregivers by supporting health literacy, referring them to the credible sources, and helping them cope with the anxiety caused by doubtful or contradictory information.

Lastly, the findings highlight the necessity of organized psychological aid to the caregivers of neurodevelopmentally disabled children. Due to the key position of the cognitive processes in cyberchondria, such interventions as metacognitive therapy (MCT), cognitive-behavioral therapy (CBT), psychoeducation, and uncertainty-tolerance training seem especially appropriate to the population (Wells, 2011; Fergus & Spada, 2017). There is evidence that these interventions have the potential to decrease maladaptive metacognitive beliefs, reassurance-seeking behaviors, and emotional regulation among caregivers, which is likely to lead to improved parental well-being and may also aim to achieve better child outcomes (Dykens et al., 2014; Feinberg, 2013).

To sum up, this paper provides much information with the help of which the presence of cyberchondria among caregiving populations can be characterized as the result of cognitive vulnerabilities, stress due to uncertainty, and a lack of adaptive thinking styles, rather than an individual character feature or a demographical determinant. The study sheds light on these processes, and it can be used to create more effective, specific, and empathetic programs. Supporting caregivers in managing uncertainty and modifying unhelpful cognitive processes has the potential to significantly improve both their psychological well-being and the overall quality of care provided to their children.

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Appendix A

Demographic Sheet

Gender: Male / Female — **جنس:** مرد / عورت

Age: _____ — **عمر**

Marital status: Married / Divorced / Widow — **ازدواجی حیثیت:** شادی شدہ / طلاق یافتہ / بیوہ

Education: Matric, Intermediate, BA/ BS, MA/ MS, PhD — **تعلیم:** میٹرک، انٹرمیڈیٹ، بی اے/ بی ایس، ایم اے/ ایم ایس، پی ایچ ڈی

Socioeconomic Status: Lower class, Middle class, Upper class — **معاشرتی حیثیت:** نچلا طبقہ، متوسط طبقہ، اعلیٰ طبقہ

Family Structure: Nuclear / Joint — **خاندانی نظام:** الگ رہائش / مشترکہ رہائش

Employment Status: Employed / Unemployed — **روزگار کی حالت:** برسر روزگار / بے روزگار

Number of children and their ages: — **بچوں کی تعداد اور ان کی عمریں**

_____

_____

_____

Diagnosis of the child: _____ — **بچے کی تشخیص**

Appendix B

اجازت نامہ

.1	میں اس بات کی تصدیق کرتا / کرتی ہوں کہ مجھے اس تحقیق کے بارے میں اور اس میں ہونے والی سرگرمیوں اور طریقہ کار کے بارے میں معلومات فراہم کی گئی ہیں۔	☐
.2	میں جانتا / جانتی ہوں کے میری شرکت رضاکارانہ ہے اور میں کسی بھی وقت بغیر کسی فائدے یا نقصان کے اپنی شرکت ختم کرنے کا حق برقرار رکھتا / رکھتی ہوں۔	☐
.3	میں سمجھتا / سمجھتی ہوں کہ میری معلومات خفیہ رہیں گی اور صرف تحقیقی مقاصد کے لئے استعمال کی جائیں گی۔	☐
.4	ظاہر نہیں کی جائے گی۔ میں اس تحقیق میں حصہ لینے میں یہ بھی جانتا / جانتی ہوں کے نتائج کے شائع ہونے پر میری شناخت کسی بھی طرح کے لئے رضامند ہوں	☐
.5	آپ نے قیمتی وقت کے لیے شکریہ اور آپ کے پاس کوئی سوال ہے تو براہ مہربانی رابطہ کرنے کے لیے آزاد محسوس کریں۔ Email: mehakarif2000@gmail.com	☐

نام _____

دستخط _____

مورخہ _____

Appendix C

مہربانی فرما کرنمبر کے گرد دائرہ لگائیے جس سے آ پ سب سے زیادہ متفق ہیں۔

		پالکل میری خصوصیت ہے	کافی حد تک میری خصوصیت ہے	کسی حد تک میری خصوصیت ہے	کافی حد تک میری خصوصیت نہیں	میری پالکل خصوصیت نہیں ہے
1	غیر متوقع حالات مجھے بہت زیادہ پریشان کر دیتے ھیں۔	5	4	3	2	1
2	مکمل مطلوبہ معلومات نہ ھونے کی وجہ سے مجھے الجھن ھوتی ھے۔	5	4	3	2	1
3	بےیقینی مجھے بھرپور زندگی گزارنے سے روکتی ھے	5	4	3	2	1
4	ایک شخص کو غیر یقینی صورتحال سے بچنے کے لئیے ھمیشہ تیار رھنا چاھئے	5	4	3	2	1
5	ایک چھوٹا غیر متوقع واقعہ بہترین تیاری کے باوجود سب کچھ خراب کر سکتا ھے۔	5	4	3	2	1
6	جب عمل کرنے کا موقع آتا ھے تو غیر یقینی مجھے مفلوج کر دیتی ہے۔	5	4	3	2	1
7	جب مجھے بےیقینی کی کیفیت ھوتی ھے تو میں درست طریقے سے کام نہیں کر سکتا/کر سکتی	5	4	3	2	1
8	میں ھمیشہ جاننا چاہتا ھوں/ چاھتی ھوں کہ مستقبل میں میرے لئیے کیا ہے۔	5	4	3	2	1
9	میں غیر یقینی صورتحال کو برداشت نہیں کر سکتا/کر سکتی	5	4	3	2	1
10	چھوٹا سا شک بھی مجھے کام پر عمل کرنے سے روک دیتا ھے	5	4	3	2	1
11	ہر کام کو کرنے کے لئیے مجھے پہلے سے ہی منظم ھونا چاھیے۔	5	4	3	2	1
12	مجھے تمام غیر یقینی حالات سے دور رھنا چاھیے۔	5	4	3	2	1

Appendix D

مہربانی فرما کرنمبر کے گرد دائرہ لگائیے جس سے آپ سب سے زیادہ متفق ہیں۔

	میں ایک ایسا شخص ہوں.....	بالکل متفق نہیں	تھوڑا متفق نہیں	کوئی رائے نہیں	تھوڑا متفق	پوری طرح متفق
1	جو پرسکون رہتا ہے اور دباؤ کو اچھے طریقے سے سنبھالتا ہے	5	4	3	2	1
2	جو ناکامی کے بعد بھی پر امید رہتا ہے۔	5	4	3	2	1
3	جس کا مزاج اتار چڑھاؤ کا شکار رہتا ہے۔	1	2	3	4	5
4	جو اکثر تناؤ محسوس کرتا ہے۔	1	2	3	4	5
5	جو خود کو محفوظ اور پُراعتماد محسوس کرتا ہے۔	5	4	3	2	1
6	جذباتی طور پر مستحکم ہے اور آسانی سے پریشان نہیں ہوتا	5	4	3	2	1
7	جو اکثر فکر مند رہتا ہے	1	2	3	4	5
8	جو اکثر اداسی محسوس کرتا ہے	1	2	3	4	5
9	جو اپنے جذبات پر قابو رکھتا ہے۔	5	4	3	2	1
10	جو بہت کم ہی بےچینی یا خوف محسوس کرتا ہے	5	4	3	2	1
11	جو اکثر افسردہ اور مایوس رہتا ہے	1	2	3	4	5
12	جو جلد جذباتی ہو جاتا ہے اور مزاج بدل لیتا ہے	1	2	3	4	5

Appendix E

		کبھی نہیں	بہت کم	کبھی کبھار	اکثر	ہمیشہ
1	اگر مجھے جسم میں کوئی غیر واضح علامت محسوس ہو تو میں اس کے بارے میں انٹرنیٹ پر تلاش شروع کر دیتا ہوں۔	1	2	3	4	5
2	علامات یا ممکنہ بیماریوں کی آن لائن تحقیق میری توجہ خبروں، کھیلوں یا تفریحی مضامین پڑھنے سے ہٹا دیتی ہے۔	1	2	3	4	5
3	میں ایک ہی ممکنہ بیماری کے بارے میں مختلف ویب صفحات پڑھتا ہوں۔	1	2	3	4	5
4	جب میں آن لائن پڑھتا ہوں کہ میری کوئی علامت کسی نایاب یا سنگین بیماری سے جڑی ہو سکتی ہے تو میں گھبرا جاتا ہوں۔	1	2	3	4	5
5	علامات یا ممکنہ بیماریوں کی آن لائن تحقیق مجھے اپنے ڈاکٹر سے مشورہ کرنے پر مجبور کر دیتی ہے۔	1	2	3	4	5
6	میں بار بار ایک ہی علامات کو انٹرنیٹ پر تلاش کرتا ہوں۔	1	2	3	4	5
7	علامات یا ممکنہ بیماریوں کی تحقیق میرے کام میں خلل ڈالتی ہے (جیسے ای میلز لکھنا یا دستاویزات پر کام کرنا)۔	1	2	3	4	5
8	میں خود کو ٹھیک سمجھتا ہوں، جب تک کہ میں آن لائن کسی سنگین بیماری کے بارے میں نہ پڑھ لوں۔	1	2	3	4	5
9	علامات یا ممکنہ بیماریوں کی تحقیق کے بعد میری بے چینی اور پریشانی بڑھ جاتی ہے۔	1	2	3	4	5
10	علامات کی آن لائن تحقیق میری آف لائن سماجی سرگرمیوں میں مداخلت کرتی ہے (مثلاً دوستوں یا خاندان کے ساتھ وقت کم گزارنا)۔	1	2	3	4	5
11	میں اپنے ڈاکٹر کو مشورہ دیتا ہوں کہ شاید مجھے وہ تشخیصی عمل کروانا چاہیے جو میں نے آن لائن پڑھا ہے (جیسے بائیوپسی یا مخصوص خون کا ٹیسٹ)۔	1	2	3	4	5

Appendix F

مہربانی فرما کرنمبر کے گرد دائرہ لگائیے جس سے آپ سب سے زیادہ متفق ہیں۔

		کبھی نہیں	بہت کم	کبھی کبھار	اکثر	ہمیشہ
1	اگر مجھے جسم میں کوئی غیر واضح علامت محسوس ہو تو میں اس کے بارے میں انٹرنیٹ پر تلاش شروع کر دیتا ہوں۔	1	2	3	4	5
2	علامات یا ممکنہ بیماریوں کی آن لائن تحقیق میری توجہ خبروں، کھیلوں یا تفریحی مضامین پڑھنے سے ہٹا دیتی ہے۔	1	2	3	4	5
3	میں ایک ہی ممکنہ بیماری کے بارے میں مختلف ویب صفحات پڑھتا ہوں۔	1	2	3	4	5
4	جب میں آن لائن پڑھتا ہوں کہ میری کوئی علامت کسی نایاب یا سنگین بیماری سے جڑی ہو سکتی ہے تو میں گھبرا جاتا ہوں۔	1	2	3	4	5
5	علامات یا ممکنہ بیماریوں کی آن لائن تحقیق مجھے اپنے ڈاکٹر سے مشورہ کرنے پر مجبور کر دیتی ہے۔	1	2	3	4	5
6	میں بار بار ایک ہی علامات کو انٹرنیٹ پر تلاش کرتا ہوں۔	1	2	3	4	5
7	علامات یا ممکنہ بیماریوں کی تحقیق میرے کام میں خلل ڈالتی ہے (جیسے ای میلز لکھنا یا دستاویزات پر کام کرنا)۔	1	2	3	4	5
8	میں خود کو ٹھیک سمجھتا ہوں، جب تک کہ میں آن لائن کسی سنگین بیماری کے بارے میں نہ پڑھ لوں۔	1	2	3	4	5
9	علامات یا ممکنہ بیماریوں کی تحقیق کے بعد میری بےچینی اور پریشانی بڑھ جاتی ہے۔	1	2	3	4	5
10	علامات کی آن لائن تحقیق میری آف لائن سماجی سرگرمیوں میں مداخلت کرتی ہے (مثلاً دوستوں یا خاندان کے ساتھ وقت کم گزارنا)۔	1	2	3	4	5
11	میں اپنے ڈاکٹر کو مشورہ دیتا ہوں کہ شاید مجھے وہ تشخیصی عمل کروانا چاہیے جو میں نے آن لائن پڑھا ہے (جیسے بائیوپسی یا مخصوص خون کا ٹیسٹ)۔	1	2	3	4	5
12	علامات یا ممکنہ بیماریوں کی تحقیق مجھے دوسرے طبی ماہرین (جیسے کنسلٹنٹس) سے مشورہ کرنے پر مجبور کرتی ہے	1	2	3	4	5