Journal Website

Article history:
Received 01 December 2024
Revised 15 January 2025
Accepted 02 February 2025
Published online 03 March 2025

Iranian Journal of Neurodevelopmental Disorders

Volume 4, Issue 1, pp 150-159

Journal of Neurodevelopmental Disorder

E-ISSN: 2980-9681

Structural Equation Modeling of the Mediating Role of Experiential Avoidance and Distress Tolerance in the Relationship Between Health Anxiety and Rumination in Patients With Hypertension

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A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Rafiepoor, A., Moghimi, S., Karfeh Raveshi, F., & Kordmirza Nikoozadeh, E. (2025). Structural Equation Modeling of the Mediating Role of Experiential Avoidance and Distress Tolerance in the Relationship Between Health Anxiety and Rumination in Patients With Hypertension. *Iranian Journal of Neurodevelopmental Disorders, 4*(1), 150-159.
https://doi.org/10.61838/kman.jndd.4.1.17

A B S T R A C T

Purpose: This study aimed to investigate the mediating roles of experiential avoidance and distress tolerance in the relationship between health anxiety and rumination among patients with hypertension.

Methods and Materials: This descriptive correlational study was conducted on a sample of 443 patients with hypertension in Tehran, selected using the Morgan and Krejcie sample size table. Standardized questionnaires were used to assess health anxiety, experiential avoidance, distress tolerance, and rumination. Data were analyzed using SPSS-27 for descriptive and inferential statistics, including Pearson correlation, and AMOS-21 for structural equation modeling (SEM) to test the proposed mediation model.

Findings: The results indicated significant positive correlations between health anxiety and both experiential avoidance ($r = .47$, $p < .001$) and rumination ($r = .51$, $p < .001$), while distress tolerance was negatively correlated with all variables ($r = –.42$ to $–.40$, $p < .001$). The SEM analysis revealed that health anxiety had a significant direct effect on rumination ($\beta = 0.31$, $p < .001$), as well as indirect effects through experiential avoidance ($\beta = 0.15$, $p < .001$) and distress tolerance ($\beta = –0.12$, $p < .001$). The overall model demonstrated good fit indices ($\chi^2/df = 2.21$, RMSEA = 0.052, CFI = 0.96, GFI = 0.94), confirming the hypothesized mediating model.

Conclusion: The findings highlight the importance of experiential avoidance and distress tolerance as psychological mechanisms linking health anxiety to rumination in patients with hypertension. These results underscore the need for clinical interventions aimed at enhancing distress tolerance and reducing avoidance tendencies to alleviate cognitive and emotional burdens in individuals with chronic health conditions.

Keywords: *Health Anxiety; Rumination; Experiential Avoidance; Distress Tolerance; Structural Equation Modeling; Hypertension.*

1. Introduction

Health anxiety is characterized by excessive worry and preoccupation with the belief that one is suffering from or will acquire a serious illness, often leading to significant emotional distress and behavioral dysfunction. This form of anxiety becomes particularly pronounced in individuals with chronic medical conditions such as hypertension, where normal bodily sensations may be misinterpreted as indicators of serious disease (Chan et al., 2020; Fergus et al., 2015). Patients with hypertension frequently experience somatic symptoms—like chest tightness or fatigue—that can trigger maladaptive cognitive processes such as rumination. Rumination involves repetitive, intrusive thoughts focused on distress and its potential causes and consequences, and it has been identified as a significant cognitive mechanism in the persistence of anxiety and depression (Leeuwerik et al., 2019; Reitzel et al., 2017).

Recent studies have highlighted that the relationship between health anxiety and rumination may be influenced by mediating psychological constructs such as experiential avoidance and distress tolerance. Experiential avoidance refers to the individual's tendency to evade unpleasant internal experiences—such as thoughts, emotions, or bodily sensations—even when such avoidance exacerbates psychological problems in the long term (Bagheri et al., 2023). Distress tolerance, on the other hand, is defined as a person's perceived or actual capacity to withstand negative emotional states (Mattar et al., 2025; Ruiz, 2013). These two constructs are critical in understanding why some individuals with high health anxiety are more vulnerable to maladaptive cognitive and emotional patterns such as rumination, while others are not (Martí, 2012; Mohsenabadi et al., 2025).

In particular, distress tolerance has been consistently associated with both anxiety and depression, especially in the context of chronic stress and medical conditions (Abbas et al., 2023; Vujanovic et al., 2012). Low distress tolerance may render individuals more sensitive to health-related cues, leading them to engage in catastrophizing thoughts and rumination. This is supported by findings suggesting that low levels of distress tolerance are associated with poor emotional regulation, heightened negative affectivity, and increased vulnerability to anxiety disorders (Durak et al., 2022; Reitzel et al., 2017). Individuals with high health anxiety but low tolerance for distress are more likely to amplify and ruminate over perceived health threats, thereby reinforcing their anxiety and perpetuating a cycle of psychological distress (Mohammadkhani et al., 2022; Schwartzman et al., 2024).

Experiential avoidance, closely linked to distress intolerance, further exacerbates these issues. Individuals who habitually avoid internal discomfort are more likely to suppress or escape from health-related worries through maladaptive strategies such as rumination or hypervigilant health monitoring (Addicks et al., 2017; Asadi & Bakhtiarpour, 2022). As experiential avoidance intensifies, so too does the cognitive load, as avoidance becomes less effective and intrusive thoughts become more frequent. Research supports the mediating role of experiential avoidance in various anxiety-related symptoms and psychopathologies (McLeish et al., 2024; Miguel et al., 2018), indicating its central role in emotion regulation and cognitive processing, especially under stress or perceived threat.

The COVID-19 pandemic has further underscored the relevance of these psychological constructs. Widespread health fears and uncertainty have escalated health anxiety levels globally, especially among individuals with chronic illnesses. Studies have demonstrated that during the pandemic, distress tolerance and experiential avoidance have played mediating roles between fear of illness and various psychological outcomes, including anxiety, depression, and maladaptive coping behaviors (Ariya et al., 2021; Safari, 2020; Salari et al., 2020). For example, (Mohsenabadi et al., 2025) found that distress tolerance and emotion regulation mediated the link between anxiety sensitivity and health anxiety using a transdiagnostic framework. Similarly, (Mayeli et al., 2023) identified distress tolerance and experiential avoidance as significant predictors of disordered eating, further reinforcing the general applicability of these constructs in clinical and health psychology.

From a developmental and trauma-informed perspective, distress tolerance is also believed to mediate the effects of early adversity on later anxiety and mood disorders. In a large sample, (Mattar et al., 2025) demonstrated that distress tolerance mediated the relationship between childhood maltreatment and adult anxiety. A similar mediation pathway was observed in university students, where distress tolerance accounted for the link between early trauma and poor mental health outcomes (Robinson et al., 2019). These findings are consistent with a growing body of literature suggesting that distress tolerance operates as a transdiagnostic risk factor and resilience buffer in the face of

E-ISSN: 2980-9681

psychological adversity (Aguirre et al., 2024; Alker & Radstaak, 2024).

In clinical populations, including patients with hypertension, distress tolerance has been identified as a crucial moderator of psychological well-being. A study by (Ganjari et al., 2020) reported that distress tolerance, along with cognitive flexibility and emotion regulation strategies, predicted death anxiety in hypertensive women. Moreover, (Soltani et al., 2022) found that distress tolerance mediated the association between health anxiety and perceived stress in emergency nurses, reinforcing its role in health-related anxiety contexts. Such findings are corroborated by (Sarabadani et al., 2023), who demonstrated that psychological interventions such as Acceptance and Commitment Therapy significantly improved distress tolerance and emotional regulation in individuals with generalized anxiety disorder.

Another important factor influencing these processes is the role of metacognitive beliefs and emotion-focused coping styles. Studies have shown that individuals who possess maladaptive metacognitions regarding health, such as overestimating danger or underestimating coping capacity, are more likely to exhibit health anxiety and engage in experiential avoidance and rumination (Kashiwazaki et al., 2020; Sauer et al., 2020). Such individuals often lack adaptive coping strategies and instead turn to suppressive or avoidant strategies that further intensify their distress (Anwar et al., 2024; Rauf et al., 2023).

Despite the accumulating empirical evidence, few studies have examined the interplay between health anxiety, rumination, experiential avoidance, and distress tolerance in a unified structural model. The current study aims to fill this gap by proposing a model in which experiential avoidance and distress tolerance mediate the relationship between health anxiety and rumination in patients with hypertension.

2. Methods and Materials

2.1. Study Design and Participants

This study utilized a descriptive correlational design to examine the mediating role of experiential avoidance and distress tolerance in the relationship between health anxiety and rumination in patients with hypertension. The statistical population included individuals diagnosed with hypertension who were referred to public and private clinics across Tehran. Using the Morgan and Krejcie (1970) sample size determination table, a sample of 443 participants was selected through convenience sampling. Inclusion criteria included a confirmed diagnosis of hypertension, age between 25 and 65 years, the ability to read and write Persian, and willingness to participate in the study. Participants with a history of severe psychiatric disorders or cognitive impairments were excluded. All participants provided informed consent, and ethical standards of human subject research were observed throughout the data collection process.

2.2. Measures

2.2.1. Health Anxiety

To assess the dependent variable of health anxiety, the Short Health Anxiety Inventory (SHAI) developed by Salkovskis, Rimes, Warwick, and Clark (2002) was used. This inventory is a widely recognized self-report measure designed to evaluate health-related anxieties both in the presence and absence of a diagnosed medical condition. The SHAI contains 18 items divided into two subscales: (1) Illness Likelihood and (2) Negative Consequences of Illness. Each item consists of four statements that reflect increasing levels of health anxiety, scored on a scale from 0 to 3. The total score ranges from 0 to 54, with higher scores indicating greater health anxiety. The SHAI has been validated in various populations and languages, including Persian, and has demonstrated strong internal consistency (Cronbach's alpha > 0.85) and test-retest reliability. Its validity has also been supported in Iranian clinical and non-clinical samples.

2.2.2. Experiential Avoidance

Experiential avoidance was measured using the Acceptance and Action Questionnaire-II (AAQ-II), developed by Bond et al. (2011). This instrument assesses psychological inflexibility and avoidance of unwanted internal experiences such as thoughts, feelings, and bodily sensations. The AAQ-II includes 7 items scored on a 7-point Likert scale ranging from 1 (never true) to 7 (always true), with higher scores indicating greater experiential avoidance. The questionnaire does not contain formal subscales, as it is considered unidimensional. The AAQ-II has been widely used in clinical and research contexts and shows robust psychometric properties, including high internal consistency (Cronbach's alpha typically > 0.85) and good convergent and discriminant validity. Validity and reliability of the Persian version have also been confirmed in Iranian samples.

E-ISSN: 2980-9681

2.2.3. *Distress Tolerance*

To measure distress tolerance, the Distress Tolerance Scale (DTS) developed by Simons and Gaher (2005) was employed. This scale assesses individuals' ability to withstand negative emotional states and comprises 15 items across four subscales: (1) Tolerance, (2) Appraisal, (3) Absorption, and (4) Regulation. Each item is rated on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree), with higher scores reflecting greater tolerance for distress. The DTS has demonstrated excellent psychometric properties, with internal consistency coefficients above 0.85 and confirmed factor structure. Several studies in Iran have verified the reliability and construct validity of the Persian version of the scale in clinical populations.

2.2.4. *Rumination*

Rumination was assessed using the Ruminative Responses Scale (RRS), originally developed by Nolen-Hoeksema and Morrow (1991) and revised by Treynor, Gonzalez, and Nolen-Hoeksema (2003). The revised RRS includes 22 items grouped into three subscales: (1) Reflection, (2) Brooding, and (3) Depression-related rumination. Respondents indicate how often they engage in specific ruminative behaviors on a 4-point Likert scale from 1 (almost never) to 4 (almost always). Higher scores indicate a greater tendency toward rumination. The scale has been widely validated across clinical and general populations, with strong internal consistency (Cronbach's alpha > 0.85) and established construct validity. The Persian version of the RRS has been psychometrically validated in Iranian studies and is considered a reliable tool for assessing rumination.

2.3. *Data Analysis*

Data analysis was conducted in two phases. First, descriptive statistics (mean, standard deviation, frequency, and percentage) were calculated to describe the sample characteristics. Pearson correlation analysis was used to assess the bivariate relationships between health anxiety (dependent variable) and each of the independent variables: experiential avoidance, distress tolerance, and rumination. This analysis was performed using SPSS version 27. In the second phase, a Structural Equation Modeling (SEM) approach was applied using AMOS version 21 to test the hypothesized model and examine the direct and indirect effects among the study variables. Model fit indices such as Chi-square (χ^2), RMSEA, CFI, TLI, and GFI were used to evaluate the goodness of fit of the proposed model. A significance level of $p < 0.05$ was adopted for all inferential statistics.

3. Findings and Results

Of the 443 participants in this study, 261 were female (58.9%) and 182 were male (41.1%). The participants' ages ranged from 26 to 64 years, with a mean age of 47.38 years (SD = 8.25). Regarding education level, 26.6% (n = 118) held a high school diploma, 41.3% (n = 183) had a bachelor's degree, and 32.1% (n = 142) held a graduate degree. In terms of marital status, 71.1% (n = 315) were married, 19.2% (n = 85) were single, and 9.7% (n = 43) were divorced or widowed. Most participants (68.4%, n = 303) reported being under regular medical supervision for hypertension, while 31.6% (n = 140) indicated irregular treatment adherence.

Table 1

Descriptive Statistics for Research Variables (N = 443)

Variable	Mean (M)	Standard Deviation (SD)
Health Anxiety	31.42	7.36
Experiential Avoidance	24.87	6.29
Distress Tolerance	38.74	8.54
Rumination	42.91	9.13

Participants reported moderate to high levels of health anxiety (M = 31.42, SD = 7.36) and rumination (M = 42.91, SD = 9.13). The mean score for experiential avoidance was 24.87 (SD = 6.29), indicating a moderate tendency to avoid unpleasant internal experiences. The distress tolerance mean was 38.74 (SD = 8.54), suggesting variability in participants' perceived ability to manage emotional distress.

Prior to conducting the main analyses, statistical assumptions for Pearson correlation and SEM were examined. The Kolmogorov–Smirnov test indicated normal distribution of the key variables, with non-significant results

E-ISSN: 2980-9681

for health anxiety (Z = 0.81, p = 0.52), experiential avoidance (Z = 0.75, p = 0.61), distress tolerance (Z = 0.77, p = 0.58), and rumination (Z = 0.84, p = 0.49). Multicollinearity was checked using Variance Inflation Factor (VIF) values, all of which were below the threshold of 5 (range: 1.12 to 2.03), indicating no serious multicollinearity concerns. Linearity and homoscedasticity were confirmed through scatterplots and residual plots. The data also met the SEM requirement for sample size adequacy (N > 200), and Mardia's coefficient for multivariate normality was 4.85, which falls within the acceptable range.

Table 2

Pearson Correlations Among Research Variables

Variable	1	2	3	4
1. Health Anxiety	—			
2. Experiential Avoidance	.47** (p < .001)	—		
3. Distress Tolerance	-.42** (p < .001)	-.38** (p < .001)	—	
4. Rumination	.51** (p < .001)	.44** (p < .001)	-.40** (p < .001)	—

There were significant positive correlations between health anxiety and both experiential avoidance (r = .47, p < .001) and rumination (r = .51, p < .001), while distress tolerance was negatively correlated with all other variables, particularly with health anxiety (r = –.42, p < .001) and rumination (r = –.40, p < .001). Experiential avoidance was also positively associated with rumination (r = .44, p < .001).

Table 3

Goodness-of-Fit Indices for the Structural Model

Fit Index	Value	Recommended Threshold
Chi-Square (χ^2)	134.52	—
Degrees of Freedom (df)	61	—
χ^2/df	2.21	< 3.00
GFI	0.94	≥ 0.90
AGFI	0.90	≥ 0.90
CFI	0.96	≥ 0.90
RMSEA	0.052	≤ 0.08
TLI	0.95	≥ 0.90

The model showed a good fit to the data. The Chi-square/df ratio was 2.21, within the recommended range. Goodness-of-fit indices such as GFI (0.94), AGFI (0.90), CFI (0.96), and TLI (0.95) exceeded standard thresholds, and RMSEA (0.052) was well below the upper limit of 0.08, indicating a satisfactory model fit.

Table 4

Standardized and Unstandardized Path Coefficients (Total, Direct, and Indirect Effects)

Path	b	S.E.	β	p
Health Anxiety → Experiential Avoidance	0.63	0.08	0.47	< .001
Health Anxiety → Distress Tolerance	-0.59	0.07	-0.42	< .001
Health Anxiety → Rumination (Direct)	0.39	0.06	0.31	< .001
Experiential Avoidance → Rumination	0.41	0.07	0.33	< .001
Distress Tolerance → Rumination	-0.36	0.08	-0.28	< .001
Health Anxiety → Rumination (Indirect via Experiential Avoidance)	0.26	—	0.15	< .001
Health Anxiety → Rumination (Indirect via Distress Tolerance)	-0.21	—	-0.12	< .001
Health Anxiety → Rumination (Total Effect)	0.44	—	0.34	< .001

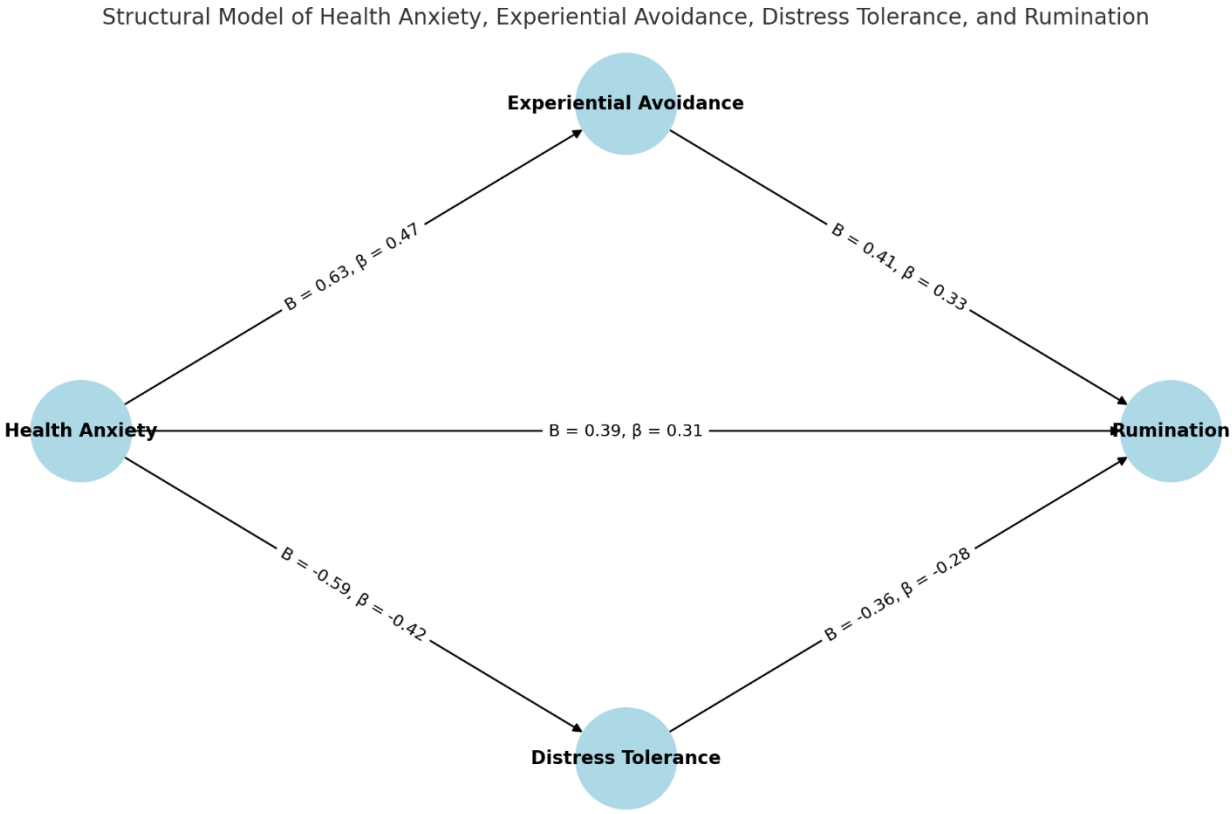
The structural model confirmed both direct and indirect pathways. Health anxiety had a significant direct effect on rumination (β = 0.31, p < .001) and also exerted indirect effects through experiential avoidance (β = 0.15, p < .001)

E-ISSN: 2980-9681

and distress tolerance (β = –0.12, p < .001). The total effect of health anxiety on rumination was β = 0.34 (p < .001), confirming the mediating roles of the two psychological constructs.

Figure 1

Final Structural Model



4. Discussion and Conclusion

The aim of this study was to investigate the mediating role of experiential avoidance and distress tolerance in the relationship between health anxiety and rumination among patients with hypertension. The results from structural equation modeling revealed that health anxiety had a significant positive effect on rumination. Furthermore, experiential avoidance and distress tolerance both served as significant mediators in this relationship, supporting the hypothesized model. Specifically, higher levels of health anxiety were associated with increased experiential avoidance and lower distress tolerance, which in turn predicted greater rumination. The model demonstrated acceptable fit indices, confirming its structural validity and theoretical plausibility.

These findings align with previous research that has emphasized the critical role of distress tolerance in modulating the impact of health anxiety on maladaptive emotional and cognitive responses. For instance, individuals with low distress tolerance are more prone to interpret ambiguous bodily symptoms as signs of illness, leading to cognitive hypervigilance and repetitive thinking patterns such as rumination (Mattar et al., 2025; Vujanovic et al., 2012). The present results are consistent with the findings of (Mohammadkhani et al., 2022), who demonstrated that low distress tolerance significantly contributed to health anxiety in the context of COVID-19, through the mediating effect of cognitive attentional syndrome. The current study extends this evidence by confirming that the same mechanism is applicable in chronic illness populations such as individuals with hypertension.

Experiential avoidance emerged as another robust mediator. This is consistent with theoretical models positing that individuals who are unwilling to experience unpleasant internal states—such as fear or uncertainty about health—tend to resort to avoidant strategies that paradoxically intensify psychological distress (Addicks et al., 2017;

E-ISSN: 2980-9681

Bagheri et al., 2023). This tendency often manifests in ruminative thinking, which functions as a passive and ineffective attempt to resolve emotional discomfort while maintaining cognitive focus on perceived threats. Studies such as those by (McLeish et al., 2024) and (Miguel et al., 2018) support this explanation, indicating that experiential avoidance is a key factor in the development and persistence of anxiety symptoms, especially when combined with low distress tolerance.

Moreover, the dual mediation model in this study is supported by transdiagnostic frameworks which suggest that both experiential avoidance and distress tolerance operate across a range of psychological conditions and influence symptom severity (Mohsenabadi et al., 2025; Ruiz, 2013). The results corroborate the findings of (Farris et al., 2014), who showed that anxiety sensitivity and distress intolerance interact to predict PTSD symptoms. The current study extends this understanding by applying it to health anxiety and highlighting the unique role of rumination as a cognitive consequence.

Rumination itself has long been associated with psychological vulnerability, especially in anxiety disorders. Previous literature has shown that individuals who score high in rumination also display greater cognitive rigidity and a tendency to overanalyze physical sensations and potential illness scenarios (Leeuwerik et al., 2019; Reitzel et al., 2017). In line with this, our findings suggest that rumination is not merely a by-product of health anxiety but is actively shaped by how individuals manage distress and internal discomfort. Specifically, those with a tendency toward experiential avoidance are more likely to ruminate as a means of indirectly processing feared health-related outcomes, which ironically increases their psychological burden.

The importance of distress tolerance in this process is further supported by studies conducted in medical and non-clinical populations. For example, (Soltani et al., 2022) showed that distress tolerance mediated the relationship between health anxiety and perceived stress among emergency nurses, while (Sarabadani et al., 2023) found that therapeutic interventions targeting distress tolerance led to improved emotional outcomes in patients with generalized anxiety disorder. Similarly, (Ariya et al., 2021) and (Safari, 2020) found distress tolerance to be a significant predictor of coronavirus anxiety among working women. These findings reinforce the notion that distress tolerance is not only a stable trait but also a modifiable factor that can improve psychological adaptation under health-related stress.

The interplay between experiential avoidance and distress tolerance also provides an explanatory framework for understanding how individuals cope with chronic illness. In hypertensive patients, distressing physical symptoms are common, and the emotional reaction to such symptoms often determines whether patients engage in adaptive or maladaptive coping. This has been elaborated by (Ganjari et al., 2020), who showed that cognitive flexibility and distress tolerance predicted levels of death anxiety in hypertensive women. The findings of the present study align with this view, suggesting that when individuals lack the capacity to tolerate distress and simultaneously seek to avoid aversive experiences, the result is increased rumination and heightened psychological distress.

Additionally, the mediating effect of these constructs is consistent with the emotion regulation model proposed by (Sauer et al., 2020), which posits that low tolerance for uncertainty and distress contributes to health anxiety and associated disorders. Likewise, (Aguirre et al., 2024) emphasized that emotional regulation strategies, including distress tolerance, mediate the relationship between personality traits and anxiety symptoms. The consistent replication of these mechanisms across diverse cultural and clinical contexts supports their generalizability and relevance to psychological health.

The findings also hold significance in trauma-informed contexts. For example, (Robinson et al., 2019) and (Mattar et al., 2025) both found that distress tolerance mediated the relationship between early life trauma and adult anxiety. These studies support the assertion that psychological resources like distress tolerance are shaped by developmental experiences and significantly influence later coping styles and cognitive tendencies such as rumination. The current results suggest that these mechanisms are not only applicable to trauma populations but also to individuals experiencing chronic health conditions.

The study also reinforces the value of targeting experiential avoidance in therapeutic interventions. Consistent with the findings of (Asadi & Bakhtiarpour, 2022) and (Valle et al., 2022), who reported that reducing avoidance leads to symptom reduction in anxiety and depressive disorders, our results suggest that addressing experiential avoidance in hypertensive patients with high health anxiety could attenuate rumination and improve psychological outcomes. This is further supported by evidence from (Anwar et al., 2024), who showed that

E-ISSN: 2980-9681

distress tolerance training improved mental health outcomes among university students.

Overall, this study adds to the growing consensus that both experiential avoidance and distress tolerance play pivotal roles in the development and maintenance of anxiety-related symptoms and that they jointly mediate cognitive processes like rumination. These findings have both theoretical and clinical implications, suggesting the need for integrative intervention models that enhance emotional resilience and reduce avoidance tendencies.

Despite the strength of the study's findings, several limitations must be acknowledged. First, the study employed a cross-sectional design, which limits causal inference. Although structural equation modeling allows for complex modeling of indirect effects, longitudinal or experimental designs are needed to establish temporal precedence. Second, the sample was limited to individuals with hypertension in Tehran, which may restrict the generalizability of findings to other chronic illness groups or cultural contexts. Third, all data were self-reported, which introduces potential biases such as social desirability or inaccurate introspection. Finally, while established and validated instruments were used, future studies may benefit from incorporating behavioral or physiological indices to triangulate self-report measures.

Future research should seek to replicate these findings in more diverse clinical populations, including individuals with other chronic illnesses such as diabetes or cardiovascular disease. Longitudinal designs would allow researchers to investigate how changes in distress tolerance and experiential avoidance influence rumination and anxiety trajectories over time. Additionally, future studies might consider examining the effectiveness of specific interventions, such as Acceptance and Commitment Therapy (ACT) or Dialectical Behavior Therapy (DBT), in enhancing distress tolerance and reducing experiential avoidance in medically vulnerable populations. Exploring potential moderators such as gender, age, or personality traits could also refine understanding of the mechanisms involved.

Clinicians working with hypertensive patients and others with chronic health conditions should assess for health anxiety, distress tolerance, and experiential avoidance as part of routine psychological evaluations. Interventions that focus on increasing tolerance of emotional distress and reducing avoidance—such as mindfulness-based interventions and cognitive-behavioral therapies—may be especially beneficial. Developing patient education programs that normalize discomfort and teach adaptive coping skills could help mitigate the emotional burden associated with chronic illness and reduce the likelihood of maladaptive cognitive patterns like rumination. Tailoring interventions to strengthen these psychological capacities may enhance overall treatment outcomes and quality of life in this population.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We hereby thank all individuals for participating and cooperating us in this study.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the study and participated in the research with informed consent.

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