Mediterranean Journal of Clinical Psychology

ISSN 2282-1619

MJCP

Volume 14, n 1, 2026

Articles

From Certainty-Seeking to Health Preoccupation: The Mediating Role of Cognitive-Emotional Processes in Health Anxiety

*Thane Arnesen Graham [1, 2], Pranayini Sharma [2], Yanbing Chen [3], Swati Prasad [2], Stanley William Davis [2], Usha Barahmand [2, 4 *]*

Abstract

Background: Health anxiety (HA) can cause significant distress in patients, leading to preoccupation with perceived illness and symptoms.

Objective: This study examines the mediating roles of cognitive-emotional processes such as need for closure (NFC), negative interpretation bias (NIB), emotional schemas (ES), intolerance of uncertainty (IU), and somatic symptom severity (SSS), in linking NFC to HA.

Method: The cross-sectional study sampled 276 participants from diverse backgrounds, with ages ranging from 18-80 years. Participants completed a 40-minute survey which consisted of standardized scales assessing these factors.

Results: Results demonstrated that while NFC does not directly predict HA, it exerts its influence through cognitive and emotional mechanisms. IU and NIB emerged as key independent mediators, while NIB and ES were associated with HA through serial paths involving somatic symptom severity.

Conclusions: Thus, our results suggest that interventions for HA may benefit from targeting constructs such as NFC, IU, NIB, and ES, which are associated with health anxiety, rather than focusing exclusively on health anxiety symptoms themselves.

[1] The University of St Andrews, Scotland, UK

[2] Columbia University, New York, New York, USA

3 Institute of Psychiatry, Psychology & Neuroscience Kings College London, London, UK

[4] City University of New York, New York, USA

E-mail corresponding author: usha.barahmand@qc.cuny.edu

Keywords:
Emotional schemas; Health anxiety; Interpretation bias; Intolerance of uncertainty; Need for closure; Somatic symptoms.

Received: 15 February 2026
Accepted: 23 April 2026
Published: 30 April 2026

Citation: Graham, T. A., Sharma, P., Chen, Y., Prasad, S., Davis, S. W., & Barahmand, U. (2026). From Certainty-Seeking to Health Preoccupation: The Mediating Role of Cognitive-Emotional Processes in Health Anxiety. *Mediterranean Journal of Clinical Psychology 14*(1).
https://doi.org/10.13129/2282-1619/mjcp-5371

1. Introduction

Health anxiety (HA) is characterized by a pervasive monitoring of bodily symptoms, regardless of whether an illness is actually present (Abramowitz et al., 2007). HA overlaps with the former diagnostic concept of hypochondriasis in its preoccupation with illness; however, HA is typically characterised by fear rather than conviction. HA has a lifetime prevalence of 6% in the general population and a prevalence of roughly 20% in hospital outpatient samples (Tyrer, 2018).

One cognitive mechanism that may underlie the development and persistence of HA is the need for closure (NFC), which is a cognitive tendency that may be responsible for the emergence and maintenance of HA. NFC is defined as the desire for definitive response and dislike of ambiguity (Kruglanski & Webster, 1996). NFC poses specific challenges as it relates to health, and has been shown to amplify the perception of threat, causing individuals to interpret neutral or ambiguous stimuli as more dangerous (Kossowska et al., 2016), a process central to the persistence of anxiety disorders. Although the need for closure has been linked broadly to elevated stress and anxiety in situations of uncertainty, it may be especially relevant in the health domain, where diagnostic information is often incomplete, and symptoms are inherently ambiguous. Individuals high in need for closure are strongly motivated to resolve ambiguity quickly, prefer definite explanations, and tend to experience greater discomfort when clear answers are not available. When applied to bodily sensations and medical information, this certainty seeking may increase the likelihood that ambiguous symptoms are viewed as threatening and encourage repeated reassurance seeking, thereby predisposing individuals to higher levels of health focused anxiety (Ianello et al., 2017; Zerna et al., 2024).

While it is known that NFC fuels general anxiety, its specific link to health anxiety is unknown. One cognitive pattern that may mediate the relationship between NFC and HA is interpretation bias (IB), which is believed to be an associated and maintaining factor in HA. In line with this broader construct, we use the term IB to refer to interpretation tendencies that can be either positive or negative and focus specifically on negative interpretation bias (NIB) as most relevant to health anxiety in the present study. It is characterized by the tendency to selectively analyze ambiguous information and situations (Du et al., 2023), and involves appraising symptoms and medical information in a way which confirms one's health-related fears, reinforcing anxious symptoms and cognitive biases. The relation between negative processing and physical symptoms amongst individuals with HA is supported by Elhamiasl et al. (2023). Findings showed that individuals with HA interpreted ambiguous health information more negatively and used less reappraisal to regulate emotions.

Building on interpretation bias in HA, recent research has sought to quantify its relative importance in various cognitive biases. Shi et al. (2024) used a machine learning algorithm to build a prediction model to recognize the most prominent signs of HA, and to identify the

biased cognitive processes which best predict individual differences in HA. Only two biases stood out as leading predictors of HA in the model: IB and attention bias. IB proved to be the more important predictor between the two, reaffirming that negative interpretation of health-related information is a key driver of HA.

While interpretation bias reflects a maladaptive way of processing external health-related information, HA is not solely driven by how individuals interpret stimuli. It is also shaped by how they interpret and regulate their internal emotional experiences. Emotional schemas (ES) are beliefs about one's own emotions, for instance whether feelings are considered understandable, acceptable, or controllable (Leahy, 2002). Leahy's model features several key dimensions to explain how people react to their feelings and which strategies they use to regulate them, including comprehensibility, acceptance, controllability, rationality, expression, and the expected duration of emotions. Research has confirmed that when these schemas are maladaptive, for example when emotions are seen as uncontrollable, they are closely tied to emotion dysregulation, prompting patterns of rumination, avoidance, or suppression, which exacerbate distress (Leahy, 2002)

These processes are particularly relevant to HA and fit within broader accounts of the cognitive and behavioral mechanisms that sustain health anxiety (Fergus & Asmundson, 2019). Recent evidence highlights the central role of emotion regulation in anxiety, particularly in relation to intolerance of uncertainty (Sun et al., 2025). Maladaptive beliefs about emotions are associated with intensified symptom-focused attention and worry within cognitive-behavioral models of HA (Salkovskis & Warwick, 2001). In this way, ES may contribute not only to general emotion dysregulation but also to the maintenance of HA.

Beyond beliefs about emotions themselves, HA may also be influenced by how individuals respond to the inherent uncertainty surrounding health information. Intolerance of uncertainty (IU) has been defined by some researchers as the dispositional inability to manage stress associated with not receiving perceived salient information across situations. As a transdiagnostic factor linked to both emotion regulation difficulties (Sahib et al., 2023) and anxiety-related outcomes (Gu et al., 2020), IU may be particularly relevant to understanding how individuals with HA respond to ambiguous health information. In the context of HA specifically, IU may amplify concerns about unclear bodily sensations and incomplete medical information, perpetuating the cycle of health-related worry.

Somatic symptom severity (SSS) is another factor theorized to maintain HA. Conceptually, SSS can reflect both the intensity and burden of physical symptoms and their close linkage with health-related worry, even though not all measures of SSS directly index attentional vigilance toward bodily sensations as distinct from the experience and reporting of symptom severity or burden. Bailey & Wells (2015) propose that HA is reinforced through metacognitions that foster

heightened attentional vigilance toward bodily sensations, which may in turn be associated with greater reporting of somatic symptoms. This is corroborated by Francis Creed (2011), who examined total somatic symptom count and HA as predictors of outcome in medical out-patient samples. Individuals scoring above established cut points on both somatic symptom count and HA reported poorer subsequent health status and greater medical consultation over follow-up than those elevated by only one dimension. These findings indicate that increased attention to bodily symptoms and health-related worry tend to co-occur and are associated with more persistent impairment. In this context, somatic symptom severity can be understood as a pragmatic indicator of somatic awareness or surveillance at the level of symptom perception and reporting, even though it does not constitute a direct measure of attentional mechanisms. It is therefore relevant to examine more specifically the ways in which somatic symptom processes are involved in the development and maintenance of HA.

In this study, we examined need for closure in the specific context of health anxiety, where ambiguity about bodily sensations and medical information is especially salient. We focus on health anxiety rather than general anxiety or worry because ambiguity about bodily sensations, diagnostic information, and medical outcomes provides a particularly salient context in which a strong need for closure is likely to manifest as health focused concern and preoccupation. Based on this framework, we hypothesized that need for closure would be associated with health anxiety indirectly through several specific pathways. First, we expected single mediator indirect effects through intolerance of uncertainty (NFC → IU → HA) and negative interpretation bias (NFC → NIB → HA). Second, we anticipated serial indirect effects in which NIB and emotional schemas would each be associated with health anxiety via somatic symptom severity (NFC → NIB → SSS → HA; NFC → ES → SSS → HA). In contrast, we did not expect robust single mediator indirect effects through emotional schemas alone (NFC → ES → HA) or through somatic symptom severity alone (NFC → SSS → HA).

2. Method

2.1 Participants

Participants were recruited online using a convenience sampling approach. The survey link was distributed via crowdsourcing and social media platforms, including LinkedIn, Reddit, Facebook, Instagram, X, and Discord, as well as other online communities, and was open to participants worldwide. No incentives were offered; participation was entirely voluntary, and only individuals who provided informed consent were able to access the survey. One individual did not consent and was not granted access to the survey. Three attention-check questions were embedded in the survey; two participants failed one or more of these checks and were removed from the dataset.

In total, 276 valid responses were obtained, with ages ranging from 18 to 80 years (M = 28.61, SD =11.63). The majority of the sample identified as female (61.2%), followed by male (37.3%) and non-binary (1.4%). Regarding racial and ethnic background, the largest groups were Asian or Asian American (42.8%) and White (38.4%). Most participants reported being single (59.1%), while 39.1% were married or in a relationship. Education levels varied, with 34.8% of participants holding a bachelor's degree and 24.3% having completed some college; 37.0% were employed full-time and 26.4% were currently unemployed. Of the 276 respondents, 9 did not provide their age and 6 had incomplete responses on the PHQ 15; thus, 270 participants provided complete data on the psychological variables used in the mediation model, and this N = 270 constitutes the analytic sample for all PROCESS analyses.

Table 1.

Demographic Characteristics of the Sample

Characteristic	Group	Frequency (*n*)	Percentage (%)
Gender	Female	169	61.2%
	Male	103	37.3%
	Non-binary	4	1.4%
Race/Ethnicity	Asian or Asian American	118	42.8%
	White	106	38.4%
	Hispanic or Latino / Latina	15	5.4%
	Black or African American	12	4.3%
	Middle Eastern / North African	7	2.5%
	Other	6	2.2%
	Multiple	12	4.3%
Relationship Status	Single	163	59.1%
	Married / In a Relationship	108	39.1%
	Separated / Divorced / Widowed	5	1.8%
Education	High School Diploma	38	13.8%
	Some College	67	24.3%
	Associate Degree	20	7.2%
	Bachelor's Degree	96	34.8%
	Graduate / Professional Degree	44	15.9%
	Other / Some High School	11	4.0%
Employment	Employed Full-time	102	37.0%
	Employed Part-time	81	29.3%
	Unemployed	73	26.4%
	Other (Retired, Student, etc.)	20	7.3%

2.2 Measures

Need for Closure Scale (NFCS)

The brief 15-item version of the NFCS (Roets & Van Hiel, 2011; Webster & Kruglanski, 1994) assesses an individual's motivation to discover conclusive answers while avoiding ambiguity.

Participants rate items such as "I don't like situations that are uncertain" on a 6-point Likert scale from 1 (strongly disagree) to 6 (strongly agree). The scale evaluates traits including decisiveness, difficulty with ambiguity, and an affinity for order. Higher scores indicate a greater need for closure. In the present sample, internal consistency was good (Cronbach's α = .83).

Short Health Anxiety Inventory (SHAI)

SHAI (Salkovskis et al., 2002) is an 18-item measure assessing worries about having or developing a serious illness based on misinterpretation of physical symptoms. Each item is rated on a 4-point scale and captures cognitive elements (e.g., disease conviction, concern) and behavioral tendencies (e.g., reassurance-seeking). The measure is reliable and well-validated for use in clinical and research settings, and higher total scores indicate higher levels of health anxiety (Salkovskis et al., 2002). In the present sample, the scale demonstrated excellent internal consistency (Cronbach's α = .90)

Intolerance of Uncertainty Scale (IUS)

The IUS (Freeston et al., 1994) consists of 27 items assessing emotional, cognitive and behavioral reactions to ambiguous situations, implications of uncertainty, and attempts to control the future. Participants respond on a 5-point scale from 1 (not at all characteristic of me) to 5 (entirely characteristic of me), with total scores ranging from 27-135; higher scores indicate greater intolerance of uncertainty. According to previous research, the IUS shows high internal consistency (α's = .91-.94) and good test-retest reliability over five weeks (r = .74; Birrell et al., 2011; Buhr & Dugas, 2002). In the present sample, internal consistency was excellent (Cronbach's α = .94).

The Leahy Emotional Schema Scale–II (LESS-2)

The LESS-2 is a 28-item self-report measure of beliefs, interpretations, and coping strategies regarding emotions (Leahy, 2002; Leahy et al., 2011). Items are rated on a 6-point Likert scale from 1 (very untrue of me) to 6 (very true of me) and yield 14 emotional schema subscales, with higher scores indicating stronger endorsement of each schema. The LESS-2 has solid internal consistency and validity in both clinical and non-clinical groups (Leahy, 2002; Leahy et al., 2011). In the present sample, internal consistency for the total score was acceptable (Cronbach's α = .85).

Ambiguous Social Scenarios Questionnaire (ASSQ)

The ASSQ (Baumgardner et al., 2024) measures interpretation biases toward ambiguous social situations. It includes six scenarios, each followed by two 5-point Likert scales (from 1= I would not think that at all to 5 = I would immediately think that), indexing positive and negative interpretations. Higher scores indicate stronger endorsement of the respective interpretation

type. The ASSQ has shown concurrent validity with IU, total anxiety, and social anxiety (Baumgardner et al., 2024). Furthermore, the ASSQ has been found to have convergent validity with two already existing measures for IB (Baumgardner et al., 2024). Because the ASSQ assesses interpretation bias in ambiguous social situations rather than health-specific interpretation bias, we used it as an index of a broader tendency toward negative interpretations in ambiguous contexts that may generalize to health-related information processing, and we regard this content mismatch as a limitation. Consistent with our focus on negative interpretation bias, we used only the six items assessing negative interpretations, summing them to create a Negative Interpretation Bias (NIB) subscale score, with higher scores reflecting a stronger tendency toward negative interpretations. In the present sample, internal reliability was satisfactory for both the positive interpretation bias subscale (Cronbach's $\alpha = .70$) and the negative interpretation bias subscale (Cronbach's $\alpha = .76$).

Patient Health Questionnaire (PHQ-15)

The PHQ 15 (Kroenke et al., 2002) assesses the severity and breadth of common somatic symptoms. Respondents rate various each somatic symptom on a 3-point scale from 0 (not bothered at all) to 2 (bothered a lot), with higher scores indicating greater somatic symptom severity and burden. In the present study, we used the PHQ 15 as an index of somatic symptom severity and burden rather than as a direct measure of attentional monitoring or surveillance of bodily sensations. Internal consistency in the present sample was good (Cronbach's $\alpha = .80$).

2.3 Procedure

The study was conducted online using Google Forms. Participants first viewed an online information and consent form outlining the purpose of the study, procedures, confidentiality, potential risks and benefits, and their right to withdraw at any time without penalty. Only participants who provided informed consent were able to proceed. Following consent, participants completed a brief demographic and background questionnaire, including age, gender identity, ethnicity, relationship status, education level, employment status, and relevant social and health-related characteristics. Participants then completed the survey which consisted of the self-report measures described above. To enhance data quality, the Google Form included three attention-check items, and cases that failed one or more of these checks were excluded from the dataset. The form was configured to allow only one submission per account/device, and completion times were reviewed to identify implausibly fast responses; no additional cases were removed based on completion time. These safeguards were implemented to reduce careless responding and support the reliability of the data. The full survey took approximately 40 minutes to complete.

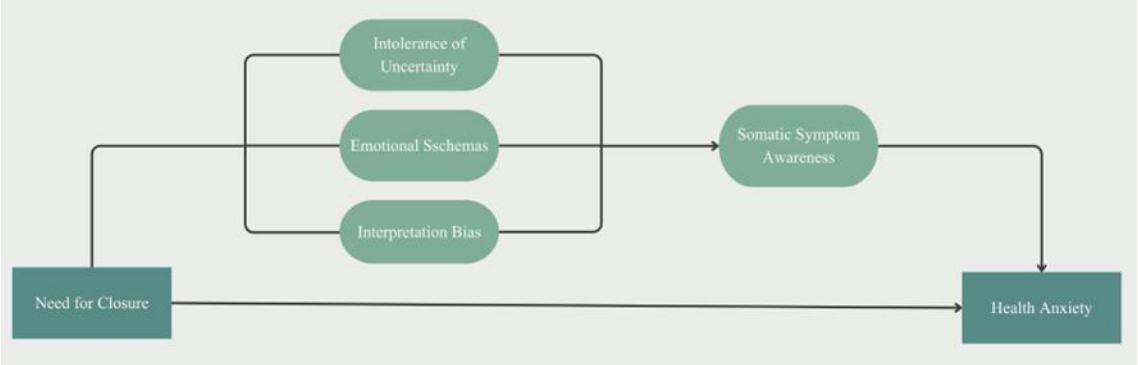
2.4 Data Analysis

Data were analyzed using SPSS and the PROCESS macro (Model 80) to examine the relationships between NFC and HA through multiple mediators. Descriptive statistics and Pearson correlations were first computed to assess variable distributions and bivariate associations. To test the proposed mediation, a serial-parallel model was specified with NIB, IU, and ES as first-stage parallel mediators and somatic symptom severity (SSS) as a second-stage serial mediator (see Figure 1). The significance of indirect effects was determined using 5,000 bootstrap samples to generate 95% percentile bootstrap confidence intervals, with effects considered significant if the intervals did not include zero.

Using the multiple regression with health anxiety as the dependent variable and NFC, NIB, IU, ES, and SSS as predictors, visual inspection of the residual histogram and normal P–P plot indicated approximately normal residuals, and the residuals-versus-predicted scatterplot showed no strong non-linearity or funnel shape, suggesting no serious violations of normality, linearity, or homoscedasticity. Because not all participants completed some demographic items (e.g., age), the N for descriptive statistics differs slightly from the analytic N; however, 270 participants provided complete data on the psychological variables included in the mediation model, and this N = 270 was used in all PROCESS analyses. We did not include additional covariates such as general anxiety, depressive symptoms, or physical health status in the mediation model; thus, all paths are unadjusted for broader negative affect or health variables. The reported degrees of freedom for the total-effect model (df = 1, 268) and full mediation model (df = 5, 264) correspond to this analytic sample size (N = 270) and the number of predictors in each regression.

Figure 1

Conceptual Model of Health Anxiety Development Through Cognitive-Emotional Pathways



3. Results

3.1 Descriptives and Correlations

The descriptive statistics and Pearson correlations for all study variables are provided in Table 2. As shown in Table 2, the mean score for NFC was 61.97 (*SD* = 10.72), while HA had a mean of 15.55 (*SD* = 8.96). All study variables were significantly and positively correlated with one another, with correlation coefficients ranging from weak to strong magnitudes.

HA demonstrated significant positive associations with NFC ($r = .227$, $p < .01$), NIB ($r = .394$, $p < .01$), and IU ($r = .449$, $p < .01$). Furthermore, HA was strongly correlated with ES ($r = .429$, $p < .01$), and SSS ($r = .553$, $p < .01$). The strongest correlation observed in the study was between IU and ES ($r = .604$, $p < .01$).

Table 2.

Descriptive Statistics and Correlations for Study Variables

Variable	*M*	*SD*	1	2	3	4	5
1. Need for Closure	61.97	10.72	—				
2. Negative Interpretation Bias	18.35	4.88	.284**	—			
3. Intolerance of Uncertainty	73.46	21.80	.556**	.419**	—		
4. Emotional Schemas	92.82	18.74	.315**	.499**	.604**	—	
5. Somatic Symptom Severity	8.53	5.16	.142*	.394**	.324**	.455**	—
6. Health Anxiety	15.55	8.96	.227**	.394**	.449**	.429**	.553**

*$p < .05$. **$p < .01$.

3.2 Mediation Analysis

The results of the serial-parallel mediation analysis (PROCESS Model 80) revealed that the overall model accounted for 40.28% of the variance in HA ($R^2 = .4028$, $F_{(5,264)} = 35.61$, $p < .001$). While NFC had a significant total effect on HA ($B = .194$, $SE = .050$, $t(268) = 3.914$, $p < .001$), the direct effect became non-significant when the mediators were included ($B = -.013$, $SE = .048$, $t(264) = -.266$, $p = .791$), indicating full mediation.

NFC was a significant predictor of all first-stage mediators, explaining 8.36% of the variance in NIB ($B = .132$, $p < .001$), 30.27% in IU ($B = 1.116$, $p < .001$), and 9.99% in ES ($B = .554$, $p < .001$). The second-stage mediator, SSS, was significantly predicted by NIB ($B = .235$, $p < .001$) and ES ($B = .088$, $p < .001$), with the model explaining 24.78% of its total variance.

As shown in Table 3, the analysis revealed several significant indirect pathways. The single-mediator path through IU was significant (*Effect* = .126, 95%*CI*[.059, .199]), as was the path through NIB (*Effect* = .026, 95%*CI*[.001, .056]). Furthermore, significant serial mediation occurred through the paths of NFC→NIB → SSS → HA (*Effect* = .022, 95%*CI*[.008, .042]) and NFC→ ES → SSS → HA (*Effect* = .035, 95%*CI*[.015, .061]). By contrast, the single-mediator

indirect effects through ES alone (NFC → ES → HA) and through somatic symptom severity alone (NFC → SSS → HA) were not significant, as their 95% confidence intervals included zero (Table 3).

Table 3

Indirect Effects of Need for Closure on Health Anxiety

Pathway	Effect	Boot SE	Boot LLCI	Boot ULCI
Total Indirect Effect	**.2065**	**.0449**	**.1193**	**.2989**
NFC → NIB → HA	**.0259**	**.0141**	**.0008**	**.0558**
NFC → IU → HA	**.1260**	**.0350**	**.0594**	**.1988**
NFC → ES → HA	.0055	.0173	-.0296	.0403
NFC → SSS → HA	-.0212	.0230	-.0643	.0254
NFC → NIB → SSS → HA	**.0223**	**.0085**	**.0083**	**.0415**
NFC → IU → SSS → HA	.0129	.0156	-.0195	.0430
NFC → ES → SSS → HA	**.0352**	**.0119**	**.0150**	**.0614**

Note. NFC = Need for Closure; NIB = Negative Interpretation Bias; IU = Intolerance of Uncertainty; ES = Emotional Schemas; SSS = Somatic symptom severity; HA = Health Anxiety. All effects are unstandardized and based on 5,000 bootstrap samples.

4. Discussion

NFC was not directly associated with HA once mediators were included but instead showed associations with HA through several cognitive and emotional mechanisms. Specifically, IU and NIB emerged as key independent mediators, while NIB and ES were involved in serial pathways through SSS that are consistent with the idea that these processes may help explain the association between NFC and HA.

Although NFC was significantly associated with HA at the bivariate level, its direct effect became non-significant once cognitive and emotional mediators were included, suggesting an indirect rather than proximal influence. This is consistent with theoretical accounts conceptualizing NFC as a trait reflecting discomfort with uncertainty and preference for definitive answers, rather than a direct predisposition to anxiety (Kruglanski & Webster, 1996; Webster & Kruglanski, 1994)

Individuals high in NFC may therefore be more distressed by ambiguity and rely on rigid, certainty-seeking strategies, which may shape the interpretation of bodily sensations and management of uncertainty. In line with cognitive models of HA (Salkovskis & Warwick, 2001), the findings indicate that NFC relates to HA through greater NIB, IU, and maladaptive ES, which in turn are associated with increased SSS. This pattern aligns with evidence emphasizing the role of cognitive–perceptual biases in maintaining HA (Marcus et al., 2007). In this study, we examined need for closure in the specific context of health anxiety, where ambiguity about bodily sensations and medical information is especially salient. Although our findings suggest

that higher NFC is associated with greater health anxiety through cognitive and emotional processes, it is possible that similar indirect pathways would emerge for broader anxiety or worry more generally. Future research should therefore test whether comparable NFC–mediated patterns are observed for general anxiety, worry, or related distress beyond the health domain.

The results also found significant pathways whereby IU and NIB independently mediated the relationship between NFC and HA. Both independent pathways were found to be significant. This corroborates previous research examining the relationship between IU and NIB to HA respectively. Shi et al.'s (2024) study affirms this, as the results found that in examining IB, attention bias, and memory bias, IB was the leading predictor of HA. Their findings also showed that people with HA interpreted ambiguous health information more negatively. IU has also been studied in relation to HA. Gu et al. (2020) found that IU mediated the association between general uncertainty and anxiety related outcomes. Taken together, our serial–parallel model (NFC → NIB/IU/ES → SSS → HA) complements existing multi-process accounts of health anxiety by formally testing how several transdiagnostic cognitive–emotional factors are associated when considered simultaneously rather than in isolation. Whereas prior work has typically examined interpretation bias, intolerance of uncertainty, emotional schemas, or somatic symptoms separately, our configuration highlights how these processes may form a linked pathway from a broad cognitive style (need for closure) to health-focused distress, a view that aligns with multi process models of health anxiety emphasizing interacting cognitive and behavioral mechanisms (Fergus & Asmundson, 2019).

This integrated structure aligns with transdiagnostic models that emphasize constellations of interacting vulnerabilities in health anxiety, and provides preliminary empirical support for viewing NFC, NIB, IU, ES, and somatic symptom severity as part of a connected system rather than as independent correlates.

The results of this study are consistent with the hypothesis that NIB is an important cognitive correlate of SSS, which in turn is associated with higher HA. Within the serial mediation model, NIB significantly predicted increased somatic awareness ($B = .235$, $p < .001$). This suggests that individuals who habitually misinterpret ambiguous or neutral health information as threatening are more likely to report paying closer attention to their bodily sensations, which may co-occur with greater reported somatic symptom burden.

This relationship aligns with cognitive-behavioral models of health anxiety, which posit that when ambiguous bodily signals are appraised as signs of serious illness, individuals may attend more closely to their bodily sensations, making normal physiological fluctuations more noticeable and distressing. Prior work has described this pattern in terms of heightened symptom monitoring or "body surveillance," and suggests that this habit leads individuals to

misinterpret benign physical sensations as threats, potentially contributing to a recurrent cycle of worry (Abramowitz et al., 2007; Tyrer, 2018). In the present study, we did not directly assess attentional monitoring; instead, our findings speak to somatic symptom severity and burden as captured by the PHQ 15. Our results are therefore consistent with the idea that a more negative interpretive style is associated with greater reported somatic symptom severity, which in turn relates to higher health anxiety, rather than providing a direct test of hypervigilance per se. However, because the PHQ 15 indexes somatic symptom severity and burden rather than attentional monitoring, any conclusions about heightened somatic vigilance in this sample should be regarded as tentative. Our findings are therefore better understood as linking negative interpretations to greater reported symptom burden, with somatic hypervigilance remaining a theoretical implication rather than a directly measured construct. Our study extends these findings by demonstrating that a negative interpretive style acts as a bridge, being associated with greater reported somatic symptom burden and, in turn, with higher health anxiety.

According to our results, ES are also associated with indicators that may reflect increased focus on somatic sensations, and with higher levels of HA. The role of SSS as a maintaining factor in HA, and the direct impact of ES on anxiety, is corroborated by previously conducted research, while our study shows how SSS mediates the relationship between ES and HA. In a study testing the relationship between beliefs about emotional schemas and dysfunctional regulation, it was found that higher guilt over emotion, a more simplistic view of emotions, greater rumination, less acceptance of feelings, and viewing one's emotions as less comprehensible, controllable, and different from emotions others have were linked with anxiety (Leahy, 2002). This demonstrates the manner in which ES may result in higher HA.

Results of Barsky's (1979) study on somatosensory amplification, which is the unusually intense experience of bodily sensations by patients, demonstrated that individuals with HA are more susceptible to attend closely to bodily sensations and interpret them in a dangerous manner, causing them to amplify (Barsky, 1979). This supports the notion that extreme attentiveness towards bodily symptoms is a potential maintaining factor of HA. Consistent with this, work in oncology contexts has shown that somatic symptom severity, bodily hypervigilance, and catastrophic interpretations of bodily sensations predict health anxiety in loved ones of cancer patients (Lorimer et al., 2020). Similarly, Murphy et al., (2017) found that even after accounting for depressive symptoms, individuals who were more inclined to be preoccupied by their illness and were overly sensitive to bodily sensations were at risk for higher somatic symptoms and perceive their health poorly, further proving that SSS is a maintaining factor in HA.

5. Theoretical and Clinical Implications

Providing support for Barlow's Unified Protocol (UP), which includes five key components that target neuroticism and the resulting emotional dysregulation (Barlow et al., 2017), our findings focus on transdiagnostic dimensions such as neuroticism and temperament rather than categorical symptoms. These results also suggest that interventions for HA may benefit from focusing on cognitive structures like NFC, IU, NIB, and ES, alongside HA itself, as these constructs are associated with HA in ways consistent with maintaining processes. It has been proven more efficient and cost-effective, with lesser participant attrition (Barlow et al., 2017), to use one protocol instead of multiple protocols to successfully treat commonly occurring anxiety disorders. Similarly, Schema Therapy, which targets characterological aspects and maladaptive patterns of thinking to treat personality disorders and other chronic conditions, may also be extended for use with anxiety disorders (Hawke & Provencher, 2011).

6. Limitations and Future Research

This study is not without limitations. Its cross-sectional nature precludes our making causal connections between variables and our small sample convenience-based online sample limits generalizability to broader and clinical populations. In addition, we relied on a measure of negative interpretation bias in ambiguous social situations (ASSQ) rather than a health-specific interpretation bias measure, so inferences about health-related interpretation processes should be viewed as indirect. We also used the PHQ 15 as an index of somatic symptom severity and burden rather than a direct measure of somatic monitoring or body-focused attentional surveillance, which means that interpretations concerning somatic vigilance remain tentative. Finally, we did not adjust the mediation model for broader negative affect (e.g., general anxiety or depression) or physical health status, and future work should include such covariates and use longitudinal and more diverse samples to clarify the specificity and robustness of these pathways. Future research should use longitudinal designs to confirm these serial relationships and should also analyze cross-cultural factors such as using data on different demographic groups and clinical populations. Future researchers should also look to see if gender differences may be the missing link between the NFC and psychological distress.

7. Conclusions

In summary, the present findings indicate that need for closure is associated with higher health anxiety indirectly through intolerance of uncertainty and negative interpretation bias, as well as through serial pathways in which maladaptive emotional schemas and greater somatic symptom severity are linked to elevated health anxiety. These associations highlight a network of

cognitive–emotional processes through which a broader certainty seeking style may relate to health focused distress rather than suggesting a simple, direct effect.

From a clinical perspective, these results suggest that interventions for health anxiety may benefit from targeting transdiagnostic processes such as intolerance of uncertainty, negative interpretation bias, and maladaptive emotional schemas, alongside somatic symptom burden. Conceptualizing these constructs as interconnected mechanisms, rather than isolated correlates, may help refine prevention and treatment approaches for individuals experiencing high levels of health anxiety.

Ethical approval

The study adheres to international standards according to the Helsinki Declaration for human studies. Ethical Committee approval has been obtained [2025-0893-QC (IRB)]**.** Informed consent was obtained from all participants and anonymization requirements have been met. All practices were ethically adherent to high standards and compliant with relevant guidelines

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

All data will be made available from the corresponding author upon reasonable request.

Conflict of interest statement

The authors declare no conflicts of interest.

Funding

No funding was received for this study.

Authors' Contribution

TG: study framework design, literature review / research, data collection, data re-coding, manuscript writing, manuscript editing, figure design; PS: data collection, manuscript writing, manuscript editing; YB: data collection, manuscript writing, manuscript editing; SP: Study framework design, literature review / research, data collection; SD: data collection, manuscript writing, manuscript editing; UB: Research design, research protocol approval, data collection, data analysis, manuscript writing, manuscript revision, manuscript editing.

AI Disclosure Statement

The authors declare that no artificial intelligence (AI) tools, including generative AI systems, were used in the conception, design, analysis, interpretation of data, drafting, or writing of this manuscript. All intellectual content, scientific reasoning, and manuscript preparation were carried out solely by the authors.

References

1. Abramowitz, J. S., Olatunji, B. O., & Deacon, B. J. (2007). Health anxiety, hypochondriasis, and the anxiety disorders. *Behavior Therapy*, *38*(1), 86–94. https://doi.org/10.1016/j.beth.2006.05.001
2. Bailey, R., & Wells, A. (2015). Development and initial validation of a measure of metacognitive beliefs in health anxiety: The MCQ-HA. *Psychiatry Research*, *230*(3), 871–877. https://doi.org/10.1016/j.psychres.2015.11.035
3. Barlow, D. H., Farchione, T. J., Bullis, J. R., Gallagher, M. W., Murray-Latin, H., Sauer-Zavala, S., Bentley, K. H., Thompson-Hollands, J., Conklin, L. R., Boswell, J. F., Ametaj, A., Carl, J. R., Boettcher, H. T., & Cassiello-Robbins, C. (2017). The unified protocol for transdiagnostic treatment of emotional disorders compared with diagnosis-specific protocols for anxiety disorders: a randomized clinical trial. *JAMA Psychiatry*, *74*(9), 875. https://doi.org/10.1001/jamapsychiatry.2017.2164
4. Barsky, A. J. (1979). Patients who amplify bodily sensations. *Annals of Internal Medicine*, *91*(1), 63–70. https://doi.org/10.7326/0003-4819-91-1-63
5. Baumgardner, M., LaGattuta, A. K., & Allen, K. B. (2024). A brief measure of positive and negative interpretation biases: development and validation of the ambiguous social scenarios questionnaire. *Assessment*, *31*(3), 715–731. https://doi.org/10.1177/10731911231176275
6. Birrell, J., Meares, K., Wilkinson, A., & Freeston, M. (2011). Toward a definition of intolerance of uncertainty: A review of factor analytical studies of the Intolerance of Uncertainty Scale. *Clinical Psychology Review*, *31*(7), 1198–1208. https://doi.org/10.1016/j.cpr.2011.07.009
7. Buhr, K., & Dugas, M. J. (2002). The intolerance of uncertainty scale: Psychometric properties of the English version. *Behaviour Research and Therapy*, *40*(8), 931–945. https://doi.org/10.1016/S0005-7967(01)00092-4
8. Creed, F. (2011). The relationship between somatic symptoms, health anxiety, and outcome in medical out-patients. *Psychiatric Clinics of North America*, *34*(3), 545–564. https://doi.org/10.1016/j.psc.2011.05.001
9. Du, X., Witthöft, M., Zhang, T., Shi, C., & Ren, Z. (2023). Interpretation bias in health anxiety: A systematic review and meta-analysis. *Psychological Medicine*, *53*(1), 34–45. https://doi.org/10.1017/S0033291722003427
10. Elhamiasl, M., Dehghani, M., Heidari, M., Vancleef, L. M. G., & Khatibi, A. (2023). Negative interpretation of ambiguous bodily symptoms among illness-anxious individuals: Exploring the role of developmental and maintenance constructs. *Frontiers in Psychiatry, 13*, 985125. https://doi.org/10.3389/fpsyt.2022.985125
11. Fergus, T. A., & Asmundson, G. J. G. (2019). Cognitive and behavioral mechanisms of health anxiety. In E. Hedman-Lagerlöf (Ed.), *The clinician's guide to treating health anxiety: Diagnosis, mechanisms, and effective treatment* (pp. 43–64). Elsevier Academic Press. https://doi.org/10.1016/B978-0-12-811806-1.00004-4
12. Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*(6), 791–802. https://doi.org/10.1016/0191-8869(94)90048-5
13. Gu, Y., Gu, S., Lei, Y., & Li, H. (2020). From uncertainty to anxiety: how uncertainty fuels anxiety in a process mediated by intolerance of uncertainty. *Neural Plasticity*, *2020*, 1–8. https://doi.org/10.1155/2020/8866386
14. Hawke, L. D., & Provencher, M. D. (2011). Schema theory and schema therapy in mood and anxiety disorders: a review. *Journal of Cognitive Psychotherapy*, *25*(4), 257–276. https://doi.org/10.1891/0889-8391.25.4.257

15. Iannello, P., Mottini, A., Tirelli, S., Riva, S., & Antonietti, A. (2017). Ambiguity and uncertainty tolerance, need for cognition, and their association with stress. A study among Italian practicing physicians. *Medical Education Online*, *22*(1), 1270009. https://doi.org/10.1080/10872981.2016.1270009
16. Interian, A., Allen, L. A., Gara, M. A., Escobar, J. I., & Díaz-Martínez, A. M. (2006). Somatic complaints in primary care: further examining the validity of the Patient Health Questionnaire (PHQ-15). *Psychosomatics*, *47*(5), 392–398. https://doi.org/10.1176/appi.psy.47.5.392
17. Kossowska, M., Bukowski, M., Guinote, A., Dragon, P., & Kruglanski, A. W. (2016). Self-image threat decreases stereotyping: the role of motivation toward closure. *Motivation and Emotion, 40*(6), 830–841.https://doi.org/10.1007/s11031-016-9582-6
18. Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2002). The PHQ-15: Validity of a New Measure for Evaluating the Severity of Somatic Symptoms. *Psychosomatic Medicine, 64*(2), 258-266. https://doi.org/10.1097/00006842-200203000-00008
19. Kruglanski, A. W., & Webster, D. M. (1996). Motivated closing of the mind: "seizing" and "freezing." *Psychological Review*, *103*(2), 263–283. https://doi.org/10.1037/0033-295X.103.2.263
20. Leahy, R. L. (2002). A model of emotional schemas. *Cognitive and Behavioral Practice*, *9*(3), 177–190. https://doi.org/10.1016/S1077-7229(02)80048-7
21. Leahy, R. L., Tirch, D. D., & Napolitano, L. A. (2011). *Emotion regulation in psychotherapy: a practitioner's guide*. Guilford Press.
22. Lorimer, S. B., Sansom-Daly, U. M., Stech, E. P., & Newby, J. M. (2020). Predictors of health anxiety in cancer patients' loved ones: A controlled comparison. *Psycho-Oncology*, *29*(11), 1874–1882. https://doi.org/10.1002/pon.5517
23. Marcus, D. K., Gurley, J. R., Marchi, M. M., & Bauer, C. (2007). Cognitive and perceptual variables in hypochondriasis and health anxiety: A systematic review. *Clinical Psychology Review*, *27*(2), 127–139. https://doi.org/10.1016/j.cpr.2006.09.003
24. Murphy, K. M., McGuire, A. P., Erickson, T. M., & Mezulis, A. H. (2017). Somatic symptoms mediate the relationship between health anxiety and health-related quality of life over eight weeks: somatic symptoms prospectively mediate. *Stress and Health*, *33*(3), 244–252. https://doi.org/10.1002/smi.2694
25. Roets, A., & Van Hiel, A. (2011). Item selection and validation of a brief, 15-item version of the Need for Closure Scale. *Personality and Individual Differences*, *50*(1), 90–94. https://doi.org/10.1016/j.paid.2010.09.004
26. Sahib, A., Chen, J., Cárdenas, D., & Calear, A. L. (2023). Intolerance of uncertainty and emotion regulation: A meta-analytic and systematic review. *Clinical Psychology Review*, *101*, 102270. https://doi.org/10.1016/j.cpr.2023.102270
27. Salkovskis, P. M., & Warwick, H. M. C. (2001). Meaning, misinterpretations, and medicine: a cognitive behavioral approach to understanding health anxiety and hypochondriasis. In V. Starcevic & D. R. Lipsitt (Eds.), *Hypochondriasis Modern Perspectives on an Ancient Malady* (pp. 202–222). Oxford University Press New York, NY. https://doi.org/10.1093/oso/9780195126761.003.0009

28. Salkovskis, P. M., Rimes, K. A., Warwick, H. M. C., & Clark, D. M. (2002). The Health Anxiety Inventory: development and validation of scales for the measurement of health anxiety and hypochondriasis. *Psychological Medicine*, *32*(5), 843–853. https://doi.org/10.1017/S0033291702005822
29. Shi, C., Du, X., Chen, W., & Ren, Z. (2024). Predictive roles of cognitive biases in health anxiety: A machine learning approach. *Stress and Health*, *40*(5), e3463. https://doi.org/10.1002/smi.3463
30. Sun, L., Zou, H., Li, W., Li, H., Pang, J., Cui, H., & Li, C. (2025). Intolerance of uncertainty and emotion regulation in generalized anxiety disorder: the role of reappraisal and suppression. *Behavioral Sciences*, *15*(9), 1238. https://doi.org/10.3390/bs15091238
31. Tyrer, P. (2018). Recent advances in the understanding and treatment of health anxiety. *Current Psychiatry Reports*, *20*(7), 49. https://doi.org/10.1007/s11920-018-0912-0
32. Webster, D. M., & Kruglanski, A. W. (1994). Individual differences in need for cognitive closure. *Journal of Personality and Social Psychology*, *67*(6), 1049–1062. https://doi.org/10.1037/0022-3514.67.6.1049
33. Zerna, J., Strobel, A., & Strobel, A. (2024). The Role of Need for Cognition in Well-Being – Review and Meta-Analyses of Associations and Potentially Underlying Mechanisms. *Collabra. Psychology*, *10*(1), 92885. https://doi.org/10.1525/collabra.92885

DOI: 10.13129/2282-1619/mjcp-5371