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# Novelty Seeking and Harm Avoidance in Somatic Symptom Disorder: The Mediating Role of Alexithymia

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## ABSTRACT

**Objective:** Somatic symptom disorder (SSD) is strongly shaped by personality and emotional-processing factors. This study tested a model in which novelty seeking (NS) and harm avoidance (HA) predict SSD directly and indirectly through alexithymia.

**Methods and Materials:** In a cross-sectional design, 252 students from Isfahan University of Medical Sciences were recruited. Participants completed Temperament and Character Inventory subscales for NS and HA, the 20-item Toronto Alexithymia Scale, and the Patient Health Questionnaire–15 as an index of SSD severity. Data were analyzed using structural equation modeling in AMOS 24. Model fit was evaluated with $\chi^2/df$, CFI, GFI, and RMSEA, and indirect effects were tested with 5000-sample bootstrapping and 95% confidence intervals.

**Findings:** NS and HA were positively associated with both alexithymia ($\beta = 0.31$ and 0.39, $p < .001$) and SSD ($\beta = 0.21$ and 0.26, $p < .001$). Alexithymia also predicted higher SSD scores ($\beta = 0.38$, $p < .001$). Indirect effects from NS and HA to SSD through alexithymia were significant ($\beta = 0.12$ and 0.15, $p < .001$), indicating partial mediation. The model showed good fit ($\chi^2/df = 2.18$, CFI = 0.95, GFI = 0.93, RMSEA = 0.05) and explained 27% of the variance in alexithymia and 41% in SSD.

**Conclusion:** Alexithymia partly explains how high NS and HA increase vulnerability to SSD. Assessing temperament and targeting emotional awareness and labeling in psychotherapy may help reduce somatic symptom burden in at-risk individuals.

**Keywords:** Somatic symptom disorder, novelty seeking, harm avoidance, alexithymia, structural equation modeling.

## Introduction

Somatic symptom disorder (SSD) is a condition within psychosomatic medicine, characterized by persistent physical complaints without sufficient medical explanation (Akaishi et al., 2021). Individuals with SSD experience symptoms like pain, fatigue, and gastrointestinal problems, which are distressing and disabling despite the absence of clear physical causes (Murtaza et al., 2023). A key aspect of SSD is the perception of these bodily symptoms as threatening or troubling, which heightens anxiety and emotional distress, thereby exacerbating physical complaints (Cicek et al., 2022; Maroti, 2025). Research has underscored the importance of psychological factors in SSD, emphasizing their role in symptom expression and perception. Cognitive-behavioral interventions, which target these factors, have shown efficacy in alleviating symptoms and improving patients' coping mechanisms (Maas genannt Bermpohl & Martin, 2025).

A well-established framework for understanding individual differences in vulnerability to psychosomatic disorders is Cloninger's Temperament and Character Model (Conversano et al., 2018). According to this model, specific temperament dimensions, such as novelty seeking (NS) and harm avoidance (HA), contribute to maladaptive emotional and behavioral responses (Rezaei et al., 2020). Individuals with high HA are typically anxious, cautious, and prone to avoidance behaviors Hemmati et al., (2024), whereas those with high NS exhibit impulsivity and emotional instability (Meira et al., 2022). A growing body of literature suggests significant associations between these temperament traits and somatic symptoms, although the exact psychological mechanisms mediating these relationships remain underexplored (Gatta et al., 2022).

One variable gaining attention in recent years is alexithymia, defined as the difficulty in identifying, understanding, and expressing emotions (Khalili Moghadam et al., 2024). Research indicates that individuals with high levels of alexithymia are more likely to somaticize emotional distress, expressing their emotional turmoil through physical symptoms rather than recognizing them as emotional experiences (Cicek et al., 2022; Marder et al., 2022). Numerous studies highlight alexithymia's role in the onset and persistence of chronic somatic complaints, making it a crucial factor to consider in SSD. Unlike other psychological mechanisms, alexithymia specifically disrupts the ability to accurately identify and process emotional states, making it a unique mediator in the relationship between temperament and somatic symptoms (Ucuz et al., 2022).

Given that individuals with high HA and NS often exhibit poor emotional regulation, it is plausible that alexithymia mediates the relationship between these temperament traits and SSD. By exploring this mediating pathway, this study aims to clarify the underlying cognitive and emotional mechanisms that contribute to somatic symptom expression in the absence of clear medical causes. The aim of this study is to evaluate a conceptual model where SSD is explained by NS and HA, with alexithymia serving as a mediating variable. This approach will enhance understanding of how emotional processing difficulties and temperament traits contribute to somatic symptoms, offering valuable insights for the development of more targeted psychological interventions.

*Research Hypotheses*

**H1:** NS and HA are positively associated with both alexithymia and SSD.

**H2:** Alexithymia mediates the relationship between NS, HA, and SSD Harm avoidance is positively associated with somatic symptom disorder.

## Methods and Materials

*Design and Participants*

This study employed a descriptive-correlational design with path analysis to examine whether alexithymia mediates the relationship between NS, HA, and SSD. The target population consisted of adults aged 18 to 40 years residing in Isfahan, Iran, during the data collection period from January to March 2025.

articipants were selected based on their scores on the Patient Health Questionnaire-15 (PHQ-15) Kroenke et al., (2002), with only those who scored above the established clinical cutoff for SSD included. Additional inclusion criteria were: Being within the specified age range, fluency in Persian, and providing informed consent to participate. Exclusion criteria included self-reported neurological disorders, a history of psychosis, or current use of psychiatric medications.

*Sample Size*

Participants were recruited through convenience sampling from primary health clinics, university health centers, and mental health support forums across Isfahan. An initial sample of 278 individuals completed the questionnaires. Following data screening, 14 responses were excluded due to missing data or patterned/inattentive responding. Mahalanobis distance was used to identify multivariate outliers, leading to the exclusion of an additional 12 participants. The final sample consisted of 252 valid cases meeting all inclusion criteria and exceeding the clinical threshold for SSD.

While no formal a priori power analysis was conducted, a post hoc analysis indicated that the final sample size of 252 participants exceeds the minimum recommended sample size for path analysis models with moderate complexity, as suggested by Kline (2023). However, it is important to note that the use of convenience sampling introduces selection bias, limiting the generalizability of the results. Future studies may benefit from conducting a formal a priori power analysis to more accurately determine the necessary sample size based on expected effect sizes.

The use of convenience sampling introduces selection bias, and this sampling method limits the generalizability of the findings. Additionally, the PHQ-15 screening creates the potential for diagnostic overlap, as the measure may not fully differentiate between SSD and other potential psychological disorders. While no formal a priori power analysis was conducted, the sample size exceeds the minimum recommended size for path analysis models with moderate complexity, as suggested by Kline (2023). Nevertheless, the use of non-probability sampling limits generalizability and the results should be interpreted with caution.

*Instruments*

*Toronto Alexithymia Scale***:** This is the Persian version of the 20-item Toronto Alexithymia Scale, developed by Bagby et al., (1986). It is a self-report questionnaire designed to assess alexithymia, which includes three subscales: (1) difficulty identifying feelings, (2) difficulty describing feelings, and (3) externally oriented thinking. The items are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale has demonstrated strong reliability and validity in its Persian version.

*Temperament and Character Inventory (TCI):* To assess temperament and character dimensions, the short form of the TCI Celikel et al., (2009) was utilized. This version includes four temperament dimensions (novelty seeking, harm avoidance, reward dependence, and persistence) and three character dimensions (self-directedness, cooperativeness, and self-transcendence). It is rated on a 5-point Likert scale from 1 (completely disagree) to 5 (completely agree). The Persian version has been validated with good internal consistency and construct validity.

*Patient Health Questionnaire–15 (PHQ-15):* The PHQ-15 is a 15-item scale used to assess somatic symptoms and screen for somatic symptom disorder. It measures the presence and severity of common physical symptoms. The Persian version has shown strong internal consistency and has been validated in Iranian populations.

*Analysis*

Data were analyzed using SPSS version 26 and AMOS version 24. Path analysis with maximum likelihood estimation was used to test the hypothesized mediation model, treating all variables as observed. Assumptions of multivariate normality, multicollinearity, and absence of influential outliers were tested and met. Model fit was evaluated using $\chi^2$/df, CFI, GFI, and RMSEA. The significance of indirect effects was assessed via bootstrapping with 5,000 samples and 95% bias-corrected confidence intervals.

*Ethics*

Ethical approval was obtained from the relevant institutional review board, and written informed consent was collected from all participants. They were assured of the voluntary nature of their participation and the confidentiality of their responses.

## Findings and Results

The final sample comprised 252 participants (M = 23.46 years, SD = 3.82), all of whom were students at Isfahan University of Medical Sciences. The majority of the participants were female (188 participants, 74.6%). Regarding marital status, 204 participants (81.0%) were single, 41 participants (16.3%) were married, and 5 participants (2.0%) were divorced. In terms of education, 154 participants (61.1%) held a bachelor's degree, 64 participants (25.4%) were enrolled in

postgraduate programs, and 33 participants (13.1%) had completed high school or equivalent.

Descriptive statistics revealed that the mean score for NS was 27.48 (SD = 5.86), for HA was 31.72 (SD = 6.11), for alexithymia was 53.24 (SD = 9.87), and for SSD was 11.46 (SD = 4.23). Pearson correlation analyses indicated that NS was positively associated with alexithymia ($r = .34$, $p < .001$) and SSD ($r = .29$, $p < .001$). Similarly, HA showed significant positive correlations with alexithymia ($r = .42$, $p < .001$) and SSD ($r = .36$, $p < .001$). Moreover, alexithymia was positively correlated with SSD ($r = .45$, $p < .001$). These findings support the hypothesized relationships among the study variables.

The assumptions of multicollinearity were assessed by examining the Variance Inflation Factor (VIF) and Tolerance values for each predictor. The VIF values ranged from 1.02 to 1.72, well below the commonly accepted threshold of 5, indicating no issues with multicollinearity. Tolerance values were between 0.58 and 0.98, further supporting the assumption that multicollinearity is not a concern in this model. Table 1 presents the standardized path coefficients for the direct effects among variables.

**Table 1**

*Standardized Coefficients and Significance Levels of Direct Effects*

| Path | β | S.E. | C.R. | p |
|---|---|---|---|---|
| **Novelty Seeking → Alexithymia** | 0.31 | 0.06 | 5.17 | < .001 |
| **Harm Avoidance → Alexithymia** | 0.39 | 0.07 | 5.57 | < .001 |
| **Novelty Seeking → Somatic Symptom** | 0.21 | 0.06 | 3.50 | < .001 |
| **Harm Avoidance → Somatic Symptom** | 0.26 | 0.07 | 3.71 | < .001 |
| **Alexithymia → Somatic Symptom** | 0.38 | 0.06 | 6.33 | < .001 |

As shown in Table 1, NS had a significant positive effect on alexithymia ($\beta = 0.31$, $p < .001$) and SSD ($\beta = 0.21$, $p = .002$). Similarly, HA significantly predicted higher levels of alexithymia ($\beta = 0.39$, $p < .001$) and SSD ($\beta = 0.29$, $p < .001$). Moreover, alexithymia had a direct positive effect on SSD ($\beta = 0.33$, $p < .001$). These findings confirm that both NS and HA not only directly influence the severity of SSD but also increase levels of alexithymia, which in turn strongly predicts SSD.

*Indirect Effects*

Bootstrapping was used to test the mediating effects of alexithymia in the relationships between temperament traits and somatization.

**Table 2**

*Indirect Effects*

| Relationship | Indirect Effect | 95% CI | p | Conclusion |
|---|---|---|---|---|
| Novelty Seeking → Alexithymia → Somatic Symptom | 0.12 | [0.07, 0.19] | < .001 | Partial mediation |
| Harm Avoidance → Alexithymia → Somatic Symptom | 0.15 | [0.09, 0.23] | < .001 | Partial mediation |

Table 2 presents the bootstrapped indirect effects, assessing the mediating role of alexithymia. The indirect effect of NS on SSD through alexithymia was significant ($\beta = 0.12$, 95% CI [0.07, 0.19], $p < .001$), indicating partial mediation. Similarly, HA had a significant indirect effect on SSD via alexithymia ($\beta = 0.15$, 95% CI [0.09, 0.23], $p < .001$). These results suggest that alexithymia partially mediates the relationships between both NS and HA with SSD.

This diagram (Figure 1) illustrates the hypothesized relationships between NS, HA, alexithymia, and SSD.

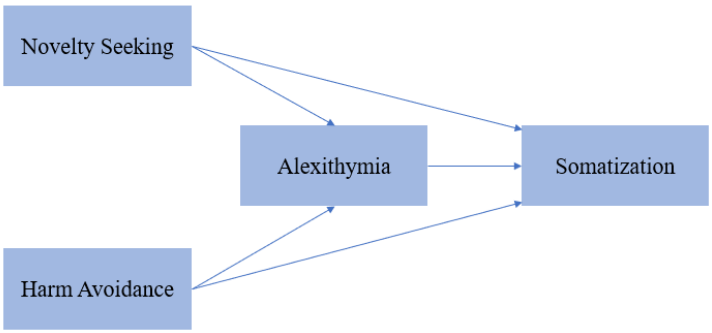


**Figure 1**

*Structural Equation Model (SEM) of the Relationship Between Novelty Seeking (NS), Harm Avoidance (HA), Alexithymia, and Somatic Symptom Disorder (SSD)*

The model accounted for 27% of the variance in alexithymia ($R^2$ = .27) and 41% of the variance in SSD ($R^2$ = .41), indicating moderate explanatory power. These values suggest that the proposed model explains a meaningful proportion of variance in both the mediator and the outcome variable.

**Table 3**

*Fit Indices for the Structural Model*

| Fit Indices | RMSEA | CFI | GFI | $\chi^2$/df |
|---|---|---|---|---|
| Acceptable Range | < .08 | > .90 | > .90 | < 3.00 |
| Obtained Values | 0.05 | 0.95 | 0.93 | 2.18 |

As shown in Table 3, the structural model demonstrated a good overall fit: RMSEA = 0.05 (acceptable < 0.08), CFI = 0.95, GFI = 0.93 (both > 0.90), and $\chi^2$/df = 2.18 (acceptable < 3.00). These fit indices indicate that the hypothesized model fits the observed data well and supports the proposed theoretical structure.

## Discussion and Conclusion

The present study aimed to evaluate a conceptual model of SSD based on NS and, with alexithymia proposed as a mediating variable. The findings indicate that NS was positively associated with SSD, suggesting that individuals high in NS may be more prone to experience or report somatic symptoms. This relationship can be explained by the impulsive and emotionally unstable nature of individuals with high NS, leading to maladaptive coping mechanisms and heightened sensitivity to bodily sensations. NS individuals' tendency to seek stimulation and novel experiences may reflect difficulties in emotional self-regulation, which can contribute to the somatization of unresolved emotional distress. This finding aligns with previous research linking impulsive personality traits to heightened somatic complaints and emotion-related bodily distress (Peritogiannis, 2015).

Similarly, the study found a significant positive association between HA and SSD. Individuals high in HA exhibit excessive worry, heightened vigilance toward potential threats, and a tendency to catastrophize ambiguous bodily sensations. Such individuals may interpret benign physical experiences as signs of serious illness, reinforcing a cycle of health anxiety and somatic symptom reporting. This finding supports cognitive-behavioral models of somatization and empirical evidence linking anxiety-prone temperaments with somatic symptomatology (Huang et al., 2016).

Furthermore, the study found a significant positive relationship between NS and alexithymia, suggesting that individuals who seek novel and intense experiences may simultaneously struggle with identifying and articulating their emotions. The impulsivity and emotional intensity characteristic of NS overwhelm the individual's ability to cognitively process emotional states, leading to emotional confusion or suppression. This finding supports the theoretical accounts linking

sensation-seeking with emotional dysregulation and deficits in emotional awareness. Existing literature also shows that novelty-seeking tendencies are often accompanied by alexithymia traits in both clinical and non-clinical populations (Petrosini et al., 2017).

Similarly, HA was positively correlated with alexithymia, indicating that individuals who are more cautious, fearful, and threat-sensitive tend to have greater difficulty identifying and expressing their emotions. This may be due to an avoidant cognitive-emotional style that discourages introspection and emotional openness. People high in HA may suppress emotions as a defensive strategy to reduce perceived vulnerability, inadvertently reinforcing alexithymic tendencies. This finding aligns with research linking harm-avoidant personality styles to emotional inhibition and reduced emotional clarity (Evren et al., 2012).

Consistent with the fifth hypothesis, alexithymia was positively associated with SSD. This suggests that individuals lacking the ability to identify and describe their emotions are more likely to express emotional distress through physical symptoms. In the absence of adequate emotional awareness or expression, unresolved affect may be somatized, leading to bodily complaints. This supports psychodynamic and cognitive-affective theories of somatization, which emphasize the role of emotional processing deficits in the development of physical symptoms. This finding aligns with a robust body of literature linking alexithymia to increased somatic complaints and medically unexplained symptoms (Xu et al., 2024).

Additionally, the study revealed that alexithymia mediated the relationship between NS and SSD. This suggests that individuals high in NS may experience SSD partly due to their difficulties with emotional processing. Rather than directly leading to SSD, NS increases vulnerability to alexithymia, which in turn contributes to bodily distress. This indirect pathway emphasizes the central role of emotional awareness in translating personality traits into physical symptomatology.

Finally, alexithymia also mediated the relationship between HA and SSD. This suggests that the tendency to avoid perceived threats and experience chronic worry may promote alexithymia traits, which then lead to increased SSD reporting. Harm-avoidant individuals may habitually suppress or disengage from emotional experiences, inadvertently fostering alexithymia and contributing to psychosomatic vulnerability. This indirect pathway highlights how emotional avoidance and regulation deficits can serve as mechanisms through which anxious personality traits influence physical health outcomes.

The current findings have several clinical implications. First, the assessment of personality traits such as HA and NS, alongside emotional awareness deficits like alexithymia, can enhance case formulation in patients with SSD. Second, interventions aimed at enhancing emotional awareness and expression—such as emotion-focused therapy (EFT), mindfulness-based approaches, or mentalization-based treatment—may help reduce SSD. Tailored interventions for high NS individuals may include more stimulating emotional awareness exercises, while those with high HA may benefit from a slower, controlled emotional processing approach. Third, psychoeducational interventions fostering interoceptive awareness and emotional literacy could help patients differentiate between physical and emotional experiences, thereby reducing symptom amplification and health-related anxiety.

Despite promising findings, this study has several limitations. The cross-sectional design limits the ability to draw conclusions about causality. Longitudinal or experimental studies are needed to determine the temporal ordering of personality traits, emotional deficits, and symptom development. The use of self-report measures introduces biases such as social desirability and limited self-insight, particularly in assessing alexithymia. Future research should incorporate multimethod assessments, including clinician-rated interviews or physiological indices.

Additionally, the sample was composed of university students, a population with higher literacy and psychological awareness, which may limit generalizability to clinical or older populations. Replication in more diverse, clinical samples is warranted. Finally, while the model accounted for a meaningful portion of variance in SSD, other variables—such as stress, trauma history, or cognitive appraisals—may further clarify the psychological pathways to somatization.

In summary, the present study provides empirical support for a conceptual model in which NS and HA contribute to SSD directly and indirectly through alexithymia. These findings underscore the role of

personality traits and emotional processing deficits in the etiology of SSD. Interventions targeting emotional awareness and regulation may be particularly effective in individuals exhibiting high levels of these personality traits, offering a more personalized and mechanism-based approach to treatment.

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## Declaration of Interest

The authors of this article declared no conflict of interest.

## Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

## Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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## Authors' Contributions

All authors equally contribute to this study.

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