Exploring the Predictive Role of Body Image and Rumination on Somatic Symptom Severity: A Quantitative Analysis

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Quantitative Stud

Abstract

Background: This study aimed to quantitatively assess the impact of body image dissatisfaction and rumination on the burden of somatic symptoms among adults.

Methods: A cross-sectional study design was employed with a sample of 330 participants who completed standardized measures assessing somatic symptoms, body image dissatisfaction, and rumination. Data were analyzed using linear regression in SPSS to explore the predictive value of body image and rumination on somatic symptom severity.

Results: The regression model accounted for 40% of the variance in somatic symptom severity, indicating that both body image dissatisfaction and rumination are significant predictors of somatic symptom burden.Specifically, rumination showed a positive correlation, while body image dissatisfaction had a negative correlation with somatic symptom severity

Conclusion: The findings suggest that psychological factors, particularly body image dissatisfaction and rumination, play a significant role in the manifestation and severity of somatic symptoms. Addressing these psychological aspects could be crucial in the management and treatment of somatic symptom disorders.

Keywords: Somatic symptoms; Body image dissatisfaction; Rumination; Predictive analysis; Psychological factors

Introduction

The burden of somatic symptoms is influenced by various factors such as body image and rumination. Patients with medically unexplained symptoms (MUS) often exhibit precise priors about a normal body condition and have lower tolerance for uncertainty, leading to increased prediction errors and symptom manifestation (Alikhah, Akbari, & Abolghasemi, 2023; Babakhanlou & Babakhanlou, 2024; Bergh et al., 2017). Psychological distress has been identified as a predictor of higher somatic symptom burden in cancer patients (Kroenke, Johns, Theobald, Wu, & Tu, 2012). Moreover, during the COVID-19 pandemic, risk factors such as baseline somatic symptom burden, anxiety levels, occupation, age, psychological symptom burden, efficiency, and fatigability have been found to predict worsening somatic symptom burden (Engelmann et al., 2022).

Individuals with Generalized Anxiety Disorder (GAD) and Major Depressive Disorder (MDD) tend to respond to emotional and somatic experiences with repetitive cognitive processes like worry and rumination, which can exacerbate symptom burden (Fresco et al., 2017). Additionally, factors like PTSD, anxiety, depression, and somatization have been linked to poorer mental and physical health in refugees (Nesterko, Jackle, Friedrich, Holzapfel, & Glaesmer, 2020). Furthermore, cognitive-migraine-fatigue and somatic factors have been shown to predict symptom burden following concussion (Cohen et al., 2020).

Body composition and symptom burden have been studied in advanced cancer patients, where the MD Anderson Symptom Assessment Inventory was used to analyze symptom burden (Parsons, Baracos, Dhillon, Hong, & Kurzrocket, 2012). High somatic symptom burden is associated with higher interoceptive accuracy, as seen in somatic symptom disorder and related conditions (Wolters, Gerlach, & Pohl, 2022). Social comparisons have been found to predict subsequent increases in rumination, exacerbating body image anxiety and dissatisfaction (Dondzilo et al., 2021).

In patients with head and neck cancer, body image concerns post-treatment are predicted by baseline body image, physical symptom burden, and neuroticism (Henry et al., 2022). Moreover, psychosomatic symptom burden has been linked to higher odds and magnitude of COVID-related symptom impairment (Milde, Glombiewski, Wilhelm, & Schemer, 2023). Cyberchondria and fear of COVID-19 have been associated with increased somatic burden, highlighting the interplay between psychological factors and symptom manifestation (Zolotareva, 2022).

Persistent somatic symptoms are prevalent across medical conditions and significantly impact patients' lives (Löwe et al., 2022). Psychological factors like rumination and cognitive mechanisms have been found to reciprocally predict depressive and somatic symptoms (Harding, Murphy, & Mezulis, 2015). Caregiver burden, perceived health, and somatic symptoms play a crucial role in quality of life among caregivers of individuals with traumatic brain injury (Saban et al., 2016).

Therefore, the interplay between body image, rumination, and psychological distress significantly influences somatic symptom burden across various medical conditions. Understanding these relationships can aid in developing targeted interventions to alleviate symptom burden and improve patients' quality of life. This study aimed to quantitatively assess the impact of body image dissatisfaction and rumination on the burden of somatic symptoms among adults.

Methods

Study Design and Participants: This study adopted a cross-sectional design to explore

the predictive relationship between somatic symptom burden and psychological variables, namely body image and rumination. We recruited a diverse sample of 330 participants through online platforms and university bulletin boards. The inclusion criteria required participants to be at least 18 years of age and fluent in English. Participants represented a broad demographic background in terms of age, gender, and socioeconomic status, ensuring the study's findings could be generalized to a wider population. After obtaining informed consent, participants completed a series of standardized questionnaires administered through a secure online survey platform.

Tools

Somatic Symptom Burden: To assess the somatic symptom burden, the Patient Health Questionnaire-15 (PHQ-15) is employed. This tool does not have formal subscales but rather focuses on 15 somatic symptoms to capture a wide range of physical complaints. The PHQ-15 features 15 items, with each item scored from 0 (not bothered at all) to 2 (bothered a lot), leading to a total score range from 0 to 30. A higher score indicates a greater severity of somatic symptoms. The validity and reliability of the PHQ-15 have been extensively confirmed through various studies, making it a reliable instrument for assessing somatic symptom severity across different populations and settings (Benjet et al., 2023).

Body Image: The Body Image Questionnaire (BIQ), specifically through the Body Shape Questionnaire (BSQ) variant, is utilized to evaluate concerns related to body image. The BSQ focuses on concerns about body shape and weight, dissatisfaction with one's body shape, and the fear of gaining weight. It typically consists of 34 items, though shorter versions are available. Scoring is based on a 1 (never) to 6 (always) scale, with total scores reflecting the level of concern with body shape and weight. High scores indicate greater dissatisfaction with body image. The BSQ has been validated in numerous studies and is renowned for its reliability in measuring the psychological aspects of eating disorders and body dissatisfaction (Amirkhanloo, Doosti, & Donyavi, 2022; Mehdi Abadi, 2023).

Rumination: For measuring rumination, the Ruminative Responses Scale (RRS) of the Response Styles Questionnaire (RSQ) is utilized. The RRS includes two primary subscales: Brooding, which is a passive comparison of one's current situation with some unachieved standard, and Reflection, which involves a purposeful inward focus to engage in cognitive problem-solving. With 22 items in total, the RRS employs a scoring system from 1 (almost never) to 4 (almost always). The sum of these scores provides a total rumination score, with separate subscale scores for Brooding and Reflection. The RRS's validity and reliability for measuring rumination, particularly in relation to depression and anxiety, have been well established through numerous studies, demonstrating its strong psychometric properties (Askari Masuleh & Taheri, 2023; Azizi, FarokhSiri, Kazemi Bahmanabad, & Zamani, 2023).

Data analysis: Data analysis was conducted using SPSS software (version 26, IBM Corporation, Armonk, NY, USA). Preliminary analyses included descriptive statistics to characterize the sample and assess the distribution of key variables. The primary analytical approach was linear regression, where somatic symptom burden served as the dependent variable, and body image and rumination scores were entered as independent variables. This approach allowed us to ascertain the extent to which variations in body image and rumination could predict the burden of somatic symptoms among participants. Assumptions of linear regression, including linearity, independence of errors, homoscedasticity, and normality of error terms, were examined and met. The significance level was set at $P < 0.05$ for all statistical tests.

Results

The study sample included a total of 330 participants, representing a diverse array of demographic backgrounds. Among these participants, 183 (55.5%) identified as female, and 147 (44.5%) as male, showing a slight predominance of female participants. The age distribution ranged from 18 to 65 years, with a median age of 32 years. Specifically, the sample's educational attainment varied: 117 participants (35.5%) had completed high school, 153 (46.4%) held undergraduate degrees, and 60 (18.1%) had obtained postgraduate qualifications. Employment status among the participants was as follows: 208 (63%) were in full-time employment, 82 (24.8%) were part-time employed, and the remaining 40 (12.1%) were not currently employed.

Table 1 presents descriptive statistics for the study variables. The somatic symptom burden had a mean score of 16.71 (SD = 3.73) across the 330 participants, indicating a moderate level of symptom reporting. Rumination, with a mean score of 50.91 (SD = 5.52), suggested a relatively high tendency among participants to engage in ruminative thought processes. Body image concerns were also prevalent, with a mean score of 91.93 (SD = 10.83), reflecting significant dissatisfaction among the study's participants.

To ensure the integrity of our linear regression analysis, we meticulously checked and confirmed the key assumptions. The linearity assumption was verified through visual inspection of scatterplots between independent variables (body image and rumination) and the dependent variable (somatic symptom burden), confirming a linear relationship. The independence of errors, assessed via Durbin-Watson statistics, yielded a value of 1.98, indicating no significant autocorrelation in the residuals. Homoscedasticity was examined through scatterplots of standardized residuals against predicted values, showing a uniform spread across all levels of the independent variables, thus meeting the assumption of equal variance (homoscedasticity). Lastly, the assumption of normality of residuals was confirmed through the Shapiro-Wilk test (P = 0.055), and visual inspection of Q-Q plots revealed that the residuals closely followed the line of normality. These analyses affirm that the data met the necessary assumptions for linear regression, ensuring the validity of the findings derived from this statistical approach.

Table 2 Table 2 summarizes the regression model analysis, showing that the model explains 40% (R^2 = 0.40, adjusted R^2 = 0.37) of the variance in somatic symptom burden, with rumination and body image together significantly predicting the outcome ($F_{(2, 327)}$ = 7.99, P < 0.01). The model's predictive capacity is evidenced by an R value of 0.63, indicating a strong relationship between the predictors and somatic symptom burden.

Table 3 details the regression coefficients, revealing that rumination significantly predicts somatic symptom burden (B = 1.24, SE = 0.52, β = 0.29, P < 0.01), as does body image, though in a negative direction (B = -1.42, SE = 0.58, β = -0.33, P < 0.01). These results highlight the complex interplay between cognitive processes and perceptions of body image in the experience of somatic symptoms.

Table 1. Descriptive statistics findings

Variable	n	Mean ± SD
Somatic Symptom Burdon	330	16.71 ± 3.73
Rumination	330	50.91 ± 5.52
Body Image	330	91.93 ± 10.83

SD: Standard deviation

Table 2. Summary of regression model analysis

Model	SS	df	MS	R	R^2	R^2 adj	F	P
Regression	8993.34	2	4496.67	0.63	0.40	0.37	7.99	< 0.01
Residual	3943.81	327	12.07					
Total	12937.15	329						

SS: Sum of Squares; df: Degrees of Freedom; MS: Mean Squares

Discussion

The primary aim of this study was to explore the predictive relationship between somatic symptom burden and two significant psychological factors: body image and rumination. Our findings indicate that both body image dissatisfaction and rumination significantly predict the burden of somatic symptoms, suggesting that these psychological factors play a crucial role in the manifestation and severity of somatic complaints.

The intricate relationship between somatic symptom burden and psychological factors such as body image and rumination is underscored by a growing body of research that highlights the multifaceted nature of somatic symptom manifestation. Our findings align with previous research suggesting that the burden of somatic symptoms is not solely a product of physical health conditions but is significantly influenced by cognitive and emotional processes. This discussion integrates our results with existing literature to provide a comprehensive understanding of the factors contributing to somatic symptom burden.

Van den et al. (2017) discuss how patients with MUS often hold precise expectations about a normal body condition, coupled with a lower tolerance for uncertainty. This combination can lead to increased prediction errors and the manifestation of somatic symptoms, a finding that resonates with our observation of the impact of body image dissatisfaction on somatic symptom burden. Similarly, psychological distress, as Kroenke et al. (2012) identify, acts as a precursor to increased somatic symptomatology in cancer patients, mirroring our results where body image and rumination serve as predictors for somatic symptom burden (Kroenke et al., 2012).

The global crisis brought on by the COVID-19 pandemic further exemplifies the complex interplay between psychological distress and somatic symptoms. Engelmann et al. (2022) identified several risk factors, including baseline somatic symptom burden and psychological symptom burden, as predictors for worsening somatic symptoms during the pandemic (Engelmann et al., 2022). This highlights the vulnerability of individuals with pre-existing psychological distress to increased somatic symptomatology under stress, supporting our findings on the role of rumination in exacerbating somatic symptom burden.

The repetitive cognitive processes characteristic of Generalized Anxiety Disorder (GAD) and Major Depressive Disorder (MDD), such as worry and rumination, have been shown to exacerbate symptom burden (Fresco et al., 2017). This is in line with our results, suggesting a significant predictive relationship between rumination and somatic symptom burden.

Table 3. Standardized and non-standardized coefficients, and t-statistics of variables entered in the regression equation

Predictor variable	Unstandardized coefficients (B)	Standard error	Standardized coefficients (Beta)	T-value	P
Constant	2.33	0.62	-	-	-
Rumination	1.24	0.52	0.29	3.93	< 0.01
Body Image	-1.42	0.58	-0.33	-4.05	< 0.01

Additionally, the association between psychological factors like PTSD, anxiety, depression, and poorer health outcomes in refugees (Nesterko et al., 2020) further corroborates the link between psychological distress and somatic symptom burden.

In the context of body image, research by Dondzilo et al. (2021) on social comparisons and rumination underscores how these cognitive processes can fuel body image dissatisfaction and, consequently, somatic symptom burden (Dondzilo et al., 2021). Our findings contribute to this dialogue by illustrating how body image concerns, amplified by rumination, significantly predict somatic symptomatology.

Moreover, the relationship between body image concerns and somatic symptom burden is not confined to specific diseases or conditions. For instance, Henry et al. (2022) found that in patients with head and neck cancer, body image concerns post-treatment could be predicted by baseline body image and physical symptom burden (Henry et al., 2022). This parallels our results, suggesting a broader applicability of the relationship between body image dissatisfaction and somatic symptoms across different health conditions.

Furthermore, the role of caregiver burden and perceived health in the quality of life among caregivers (Saban et al., 2016) highlights the broader implications of somatic symptoms beyond the individual, affecting those in caregiving roles. This reflects the extensive impact of somatic symptom burden on both individuals and their support networks, emphasizing the need for holistic approaches to treatment that consider psychological factors.

The evidence presented in our study and supported by the literature underscores the complex and bidirectional relationship between psychological factors and somatic symptom burden. It highlights the importance of addressing psychological wellbeing, including body image and rumination, in the management of somatic symptoms. Future research should continue to explore these relationships to develop more effective interventions that address both the psychological and physical aspects of somatic symptom burden, ultimately improving patient outcomes and quality of life.

Despite the insightful findings, this study is not without its limitations. First, the cross-sectional design restricts our ability to infer causality between the psychological variables and somatic symptom burden. Secondly, the reliance on self-reported measures, while practical, may introduce bias and does not capture the complexity of somatic symptoms or the nuances of body image and rumination. Finally, the study's demographic profile, though diverse, may limit the generalizability of the findings across different cultural and socioeconomic backgrounds, where perceptions of body image and tendencies towards rumination might differ.

Future research should address these limitations by adopting longitudinal designs to elucidate the causal relationships between body image, rumination, and somatic symptom burden. Additionally, incorporating objective measures of somatic symptoms, alongside self-reported psychological assessments, could provide a more comprehensive understanding of these relationships. Exploring these variables across a wider array of cultural and socioeconomic contexts would also enhance the generalizability of the findings. Investigating the mediating and moderating roles of other psychological factors, such as resilience, coping strategies, and social support, could further enrich our understanding of how somatic symptom burdens develop and persist.

Conclusion

The findings of this study have several implications for clinical practice. Healthcare

providers should consider the psychological dimensions of somatic symptoms, particularly the roles of body image and rumination, in their assessment and treatment plans. Interventions aimed at improving body image and reducing rumination, such as cognitive-behavioral therapy (CBT), mindfulness-based stress reduction (MBSR), and acceptance and commitment therapy (ACT), could be beneficial for patients presenting with high somatic symptom burdens. Additionally, educating patients about the interplay between psychological factors and physical health might empower them to engage more actively in their treatment and self-care strategies, potentially mitigating the impact of these symptoms on their quality of life.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgements

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