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Clustering Somatic Symptoms Based on Psychological Risk Factors

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Extended Abstract

Background and Objectives

Functional Somatic Syndromes (FSS) represent a complex category of disorders characterized by a range of medically unexplained physical symptoms, including fatigue, gastrointestinal discomfort, musculoskeletal pain, respiratory issues, and cognitive impairments. Despite extensive research, clustering these symptoms into meaningful categories remains challenging due to overlapping presentations and unclear etiologies.

Materials and Methods

This research was conducted using a data mining approach, specifically Association Rule Mining (ARM). A total of 643 participants from the general population in Tehran were selected through online convenience sampling. Inclusion criteria included being a resident of Tehran, not undergoing major medical treatment, and completing all survey questions.
Participants completed the following standardized instruments:
- Somatic Symptoms Checklist (Lacourt et al., 2013): assessing 47 symptoms across domains such as gastrointestinal, respiratory, cardiac, musculoskeletal, fatigue, cognitive, and miscellaneous symptoms.
- Hazan & Shaver Attachment Questionnaire: assessing secure, avoidant, and ambivalent attachment styles.
- Defense Style Questionnaire (DSQ-40): measuring mature, neurotic, and immature defense mechanisms.
- Levels of Emotional Awareness Scale (LEAS): evaluating the ability to identify and differentiate emotions in oneself and others.
Data were analyzed using Python 2.7 and the Apriori algorithm to detect "if-then" associations between psychological characteristics (antecedents) and somatic symptom categories (consequences). Measures such as support, confidence, and lift were utilized to evaluate the strength and significance of these associations.

Results

To provide a comprehensive understanding of the relationship between psychological characteristics and functional somatic symptoms, the results were organized into meaningful clusters derived from the association rule mining analysis.

The analysis identified two primary psychological profiles underlying distinct groups of somatic symptoms:

Cluster A: Cognitive, Fatigue, and Gastrointestinal Symptoms

These symptoms were predominantly associated with:

- Immature defense mechanisms, such as projection and passive aggression, indicating low psychological integration and higher vulnerability to stress.
- Ambivalent attachment styles, reflecting emotional over-involvement and heightened sensitivity to perceived rejection or inconsistency in relationships.
- Low other-focused emotional awareness, indicating a limited capacity to accurately perceive and respond to others' emotional states.

Participants demonstrating these psychological traits were more likely to report symptoms such as forgetfulness, unclear thinking, physical exhaustion, and digestive discomfort. The presence of immature defenses and ambivalent attachment increased the likelihood of these symptoms by over 70%, as shown by high-confidence rules.

Cluster B: Cardiac, Respiratory, and Musculoskeletal Symptoms

This group of symptoms correlated strongly with:

- Neurotic defenses, including repression and displacement, which reflect inner conflict and anxiety-driven coping.
- Avoidant attachment, characterized by emotional suppression and a preference for self-reliance over closeness.
- Low self-focused emotional awareness, which denotes difficulty identifying and labeling one's own emotional experiences.

Individuals in this cluster frequently reported chest pain, shortness of breath, muscular aches, and joint stiffness. One rule demonstrated that individuals with avoidant attachment had an 86% chance of experiencing musculoskeletal complaints.

Moreover, a few rules indicated overlapping patterns where emotional awareness deficiencies (either self- or other-focused) served as secondary mediators, further intensifying symptom expression.

In sum, these findings support the identification of distinct psychological pathways leading to different somatic outcomes. The results not only validate the use of psychological clustering but also provide empirical support for symptom-specific therapeutic strategies.

Discussion

The study provides strong evidence that functional somatic symptoms are not etiologically uniform. Rather, different types of symptoms are linked to distinct psychological profiles. This suggests that clustering somatic symptoms based on etiological psychological dimensions is more meaningful than relying on surface-level symptom patterns or body systems.

Immature defenses, associated with low integration and impulsivity, appear to underlie fatigue and cognitive difficulties, while neurotic defenses, linked to guilt and internal conflict, predict cardiac and respiratory symptoms. These align with psychoanalytic theories relating defense styles to symptom manifestation. The role of attachment was also pivotal: ambivalent attachment, associated with fear of abandonment and

hyperactivation of affect, was linked to energy depletion and cognitive overload. In contrast, avoidant attachment, characterized by emotional suppression and disengagement, was tied to somatic tension and musculoskeletal pain. These findings are consistent with Blatt's theory of depression prototypes and support a psychological basis for differentiating somatic symptoms.

Furthermore, emotional awareness—both self-focused and other-focused—was revealed as a major determinant in symptom expression. Impaired emotional differentiation may lead to somatic channels being used for affective expression, particularly in individuals lacking reflective capacity.

These findings lend empirical support to the splitters' perspective, indicating that somatic symptoms form discrete psychological clusters. Consequently, viewing FSS as a single syndrome may oversimplify its underlying mechanisms and hinder effective intervention.

Conclusion

This study demonstrates that functional somatic symptoms can be clustered based on psychological risk factors, specifically defense styles, attachment patterns, and emotional awareness capacities. The findings suggest that:

- There are two major psychological clusters of somatic symptoms.
- Treatment planning should consider a patient's specific psychological predispositions, not just their symptom profile.
- Psychological interventions targeting defense restructuring, attachment repair, and enhancing emotional awareness could be tailored to symptom types for greater therapeutic efficacy.

The study emphasizes the importance of a psychological taxonomy of somatic symptoms in clinical assessment and treatment. Future research should explore these clusters in clinical populations and across diverse cultures to validate the model and inform personalized interventions.