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SEÇÃO: ARTIGO

Transtornos mentais comuns em mulheres na meia idade e velhice: análise de redes

Common mental disorders in middle-aged and older women: a network analysis

Transtornos mentais comuns em mujeres en meia idade e velhice: análisis de redes

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Resumo: Transtornos Mentais Comuns (TMC) são caracterizados por sintomas difusos sem causa orgânica específica definida, com maior prevalência em mulheres. Este estudo adotou uma abordagem de redes para identificar o agrupamento de sintomas de TMC em mulheres na meia idade e velhice. A *SRQ-20* para rastreio de TMC foi respondida *online* por 545 mulheres com 40 anos ou mais. A análise indicou que "nervosismo" e "perda de interesse" foram sintomas centrais da rede. Houve cinco agrupamentos de sintomas de TMC: C1 com sintomas predominantes de ansiedade; C2 abarcou apenas sintomas gastrointestinais; C3 abarcou sintomas depressivos; C4 caracterizou-se pela tristeza; e C5 foi composta por sintomas de cansaço. Os resultados são úteis para se pensar em intervenções mais diretivas e específicas para promoção da saúde mental de mulheres mais velhas, a partir dos perfis identificados.

Palavras-chave: saúde mental; envelhecimento; ansiedade; depressão.

Abstract: Common Mental Disorders (CMDs) are characterized by diffuse symptoms without a specific organic cause and have a higher prevalence in women. This study adopted a network approach to identify the clustering of CMD symptoms in middle-aged and older women. The SRQ-20 for CMD screening was answered online by 545 women aged 40 and over. The analysis indicated that "nervousness" and "loss of interest" were central symptoms in the network. There were five clusters of CMD symptoms: C1 with predominantly anxiety symptoms; C2 included only gastrointestinal symptoms; C3 encompassed depressive symptoms; C4 was characterized by sadness; and C5 consisted of fatigue symptoms. The results are useful for considering more targeted and specific interventions for promoting the mental health of older women, based on the profiles identified.

Keywords: mental health; aging; anxiety; depression.

Resumen: Los Trastornos Mentales Comunes (TMC) se caracterizan por síntomas difusos sin una causa orgánica específica definida, con mayor prevalencia en mujeres. Este estudio adoptó un enfoque de redes para identificar la agrupación de síntomas de TMC en mujeres de mediana edad y ancianas. El SRQ-20 para el cribado de TMC fue respondido en línea por 545 mujeres de 40 años o más. El análisis indicó que "nerviosismo" y "pérdida de interés" fueron síntomas centrales en la red. Hubo cinco agrupaciones de síntomas de TMC: C1 con síntomas predominantemente de ansiedad; C2 incluyó solo síntomas gastrointestinales; C3 abarcó síntomas depresivos; C4 se caracterizó por la tristeza; y C5 consistió en síntomas de fatiga. Los resultados son útiles para considerar intervenciones más específicas y dirigidas para promover la salud mental de las mujeres mayores, en función de los perfiles identificados.

Palabras clave: salud mental; envejecimiento; ansiedad; depresión.

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Introduction

Common Mental Disorders (CMDs) are classified among the Non-Communicable Chronic Diseases (NCDs) traditionally characterized by diffuse symptoms without a defined organic or specific cause (Goldberg & Huxley, 1992). They involve psychological distress that includes non-psychotic symptoms such as insomnia, difficulty concentrating, memory loss, fatigue, irritability, feelings of worthlessness, and somatic complaints. Anxiety and depression symptoms, such as low mood, loss of interest in daily activities, feelings of worthlessness, and suicidal ideation, are also observed in CMDs (Soares & Meucci, 2020). These complaints are frequently observed among users of public health services (Scholze et al., 2021), requiring professionals to understand that this is a complex phenomenon resulting from the interaction of multiple experiences lived by individuals (Lins et al., 2021).

According to epidemiological studies, CMDs affect approximately 25% to 30% of the general population at some point in life. The prevalence of CMDs in women is considerably higher compared to men (31,6%) (Steel et al., 2014; Grapiglia et al., 2021), reaching 32,1% (Steel et al., 2014). In the Brazilian context, research indicates a high prevalence of CMDs in primary health care (Scholze et al., 2021), with women showing a higher likelihood of developing these disorders, notably in older age (Lins et al., 2021; Valença et al., 2023).

A population-based study, carried out in the South of Brazil, involving 1,128 women indicated a prevalence of 39.9% for CMDs (Grapiglia et al., 2021). While another study carried out by Senicato et al., (2018) in the southeast of Brazil, found a prevalence of 18.7%. However, it is important to mention that the authors found low educational levels, being homemakers might influence in higher prevalences of CMDs in older women compared to those who were separated or widowed (Senicato et al., 2018). The consequences of CMDs are comprehensive, affecting not only people's quality of life but also their work capacity, interpersonal relationships, and physical well-being (Wittchen et al., 2011). Furthermore, CMDs are associated with an increased risk of developing chronic conditions such as cardiovascular diseases and diabetes (Gela et al., 2024).

It is important to highlight that women are traditionally socialized to assume many social roles (taking care of family and house, having a career, having a good physical appearance, etc) that might imply in burden for them, impacting their mental health (Ferreira, 2021). In this sense, it is important to investigate how symptoms of CMD manifest in women during late life, considering that this group has been receiving less attention in studies about mental health interventions (Almeida et al., 2023). Depending on the nature of these symptoms and how they manifest and are related, we can consider more target interventions for this specific group.

Studies on CMDs generally encompass two methodological axes of investigation: (a) epidemiological research on their prevalence and relationships with correlated variables (sociodemographic, economic, and gender variables, among others) (Soares & Melucci, 2020; Valença et al., 2023); and (b) studies with qualitative designs aimed at investigating the experiences and meanings related to CMDs for individuals (Costa et al., 2014). Regarding the first axis, the Self-Reporting Questionnaire-20 (SRQ-20) has been a widely used instrument for CMD screening, with its validity established for the Brazilian population (Gonçalves et al., 2008). For this reason, this instrument was applied in our study. The cutoff points most frequently used to determine the presence of psychiatric morbidity in Brazilian women have been 7 or 8 points (Machado et al., 2021; Sathyanarayana & Manjunatha, 2019).

The SRQ-20 consists of 20 items referencing various symptoms. It has proven sensitive in differentiating clinical and non-clinical groups, as well as being a good predictor for suicide risk in the Brazilian population (Silveira et al., 2021). Its dimensions have been investigated, with the four-factor dimension being most frequently adopted in Brazil: (1) depressive/anxious mood, encompassing anxiety and depression symptoms; (2) somatic symptoms, including items

describing body pain symptoms; (3) depressive thoughts, describing beliefs related to depression; and (4) decrease in energy, encompassing items related to symptoms such as tiredness and fatigue (Silveira et al., 2021).

Statistical analyses for data derived from the SRQ-20 can focus on specific symptoms or diagnostic categories by factors. However, identifying the network relationships between symptoms (items) enables a broader and more integrated analysis of the construct (Borsboom, 2022; Broda et al., 2023). In this context, the network approach explicitly models the connections between symptoms, graphically representing how they can influence and reinforce each other within a broader system (Borsboom, 2022).

Network analysis seeks to understand the underlying structure of a set of psychological variables (e.g., symptoms, personality traits, or attitudes), their interactions, and how they mutually influence each other (Broda et al., 2023). This is particularly important for CMD analysis, as this approach enables the understanding of how different symptoms interact within a psychological network in a given sample context, identifying the most central symptoms and the network properties, which would not be possible through isolated analysis of symptoms and/or factors.

In the studies conducted in Brazil, studies using a network approach to investigate the manifestation of CMD symptoms in women aged 40 and over, as far as we know, have not yet been conducted. Moreover, there is a lack of studies focusing on the comprehension of mental health and psychological demands of middle-aged individuals (Almeida et al., 2023). Therefore, the present study adopted a network approach aiming to identify clusters of CMD symptoms in middle-aged and older women. Identifying these clusters is useful for a better understanding of the specific psychological needs of vulnerable groups in terms of mental health, contributing to the design of interventions that can better meet the needs of this population.

Method

Study Type

This was a cross-sectional, exploratory, descriptive study with a quantitative approach.

Participants

In network analysis, the sample size is still a topic of debate in literature, although a minimum of 500 observations has been cited as a reference number (Leme et al., 2020). Accordingly, 545 Brazilian women participated in the study non-probabilistically and incidentally, with ages ranging from 40 to 84 years (M = 53.5 ± 9.6), 73.7% of whom were middle-aged (40 to 59 years; M = 48.8 ± 5.7), and 26.3% were older adults (60+; M = 66.5 ± 5.7). The inclusion criteria considered the following aspects: a) age 40 years or older; b) self-identification as a woman. Those who did not meet the age criteria or did not identify as women were excluded.

Instruments

The following instruments were used for data collection:

Sociodemographic Questionnaire: This questionnaire was developed to collect detailed information about the participants regarding various sociodemographic aspects. The variables included in the questionnaire covered age, race, income in multiples of the minimum wage, educational level and gender identity.

Self-Reporting Questionnaire (SRQ): This is a self-assessment instrument developed by Harding et al. (1980). In many countries, including Brazil, a reduced version consisting of 20 questions (SRQ-20) is used. This reduced version was created to facilitate application in community and primary care contexts, especially in developing countries, due to its simplicity and low implementation cost (Gonçalves et al., 2008; WHO, 1994). The SRQ-20 consists of 20 dichotomous response scale questions (yes/no). Each affirmative response receives 1 point, and the final score ranges from 0 to 20. In Brazil, the SRQ-20 was

validated by Gonçalves et al. (2008), demonstrating good psychometric characteristics. The SRQ-20's ability to discriminate cases in psychiatric screening was .90, and its Cronbach's alpha was .86, indicating high internal consistency. The instrument presented a sensitivity of 86.33% and a specificity of 89.31% for the detection of CMDs, with positive and negative predictive values of 76.43% and 94.21%, respectively. For the present sample, the scale's internal consistency was very good (Cronbach's alpha of .87).

Procedures

Data collection was carried out through a digital form created in Google Forms, which was to be answered voluntarily and self-administered individually. All participants were informed about the aims, risks, and benefits before answering the questions for clarification, followed by the consent form, with their participation conditional upon its acceptance. Recruitment was done through the prior dissemination of a link to access the form that was online (from August 2021 to February 2022), which was shared on social media (Facebook and Instagram), WhatsApp, and emails, along with instructions for its completion.

Data Analysis

The EGAnet package was used to pre-identify communities or clusters from the SRQ-20 scale. The walktrap algorithm was used due to its adequate performance in psychological networks for detecting dimensions of variables even when the different dimensions are highly correlated (Golino et al., 2020; Golino & Epskamp, 2017).

A logistic model (Borkulo et al., 2014) regularized by l1 (LASSO) was estimated with the selection of the EBIC model (Foygel & Drton, 2010) to ensure that spurious parameters were precisely set to zero in order to obtain a more interpretable network. A hyperparameter of 0.5 was defined for the selection of the best model. Once estimated, the model was presented in a network structure. The nodes represent the questionnaire items. The lines, called edges, represent the relationship between the questionnaire items.

We evaluated which symptoms were the most important in the network. For this, the node strength centrality was analyzed, which is the most important centrality index, defined as the sum of all weights connected to a given node (Opsahl et al., 2010). In this study, closeness and betweenness centrality were not analyzed because more recent studies (Contreras et al., 2019; Hallquist et al., 2019) have indicated that these indices generally do not present stability, as they violate the principle of transitivity since they treat the association as distances. The node strength centrality was standardized and presented through the *Z* score. We investigated the stability index of the centrality measure. We estimated network models based on non-parametric bootstraps and case-dropping. By default, the bootstrap was performed with 1,000 resamplings (Epskamp & Fried, 2018). The CS coefficient was calculated, quantifying the maximum proportion of cases that can be discarded while still retaining 95% certainty. The CS coefficient should not be less than .25 and preferably greater than .50 (Epskamp & Fried, 2018).

We compared the networks of middle-aged (40 to 59 years) and older women (60 years and older) using the Network Comparison Test (NCT) (Borkulo et al., 2014). The NCT uses permutations (i.e., sample reorganization) to test whether two networks are different in terms of network structure invariance, global strength invariance, and the strength invariance of a specific edge. All statistical analyses were performed using R Version 4.4.0 software through the bootnet and qgraph packages or JASP version 0.17.3.

Ethical Considerations

The ethical and consent procedures related to research in a virtual environment were rigorously observed, following the recommendations of Resolution 510/2016 of the National Health Council and Circular Office no. 2/2021/CONEP/SECNS/MS. The study was approved by the Research Ethics Committee of Federal University of Recôncavo da Bahia (CAAE number

44084621.9.0000.0056), with support from the National Council for Scientific and Technological Development – CNPq.

Results

Table 1 shows the sociodemographic background of the sample. Participants were overall rather highly educated but reported rather evenly distributed household income.

Table 1 - *Sociodemographic background of the sample (n=545)*

Variables		Middle-aged women (n=402) %	Older women (n=143) %	Total %
Gender identity	Cisgender	97.8	100.0	98.3
	Transgender	2.3	-	1.7
Race	White	41.3	55.2	44.8
	Mixed race	37.8	25.2	34.7
	Black	20.3	16.1	19.1
	Indigenous	0.3	0.7	0.4
	Asian	0.5	2.8	1.1
Education				
	Uncompleted primary education	1.8	5.6	2.8
	Completed primary education	1.5	-	1.1
	Uncompleted secondary education	2.0	1.4	1.8
	Completed secondary education	10.5	8.4	10.1
	(BA) Higher education uncompleted	6.3	8.4	6.8
	(BA) Higher education completed	19.3	24.5	20.7
	Postgraduate degree completed	58.8	51.7	56.7
Household income	1 to 2 Minimum wage	22.0	18.9	21.3
	3 to 4 Minimum wage	23.3	21.7	22.9
	5 to 8 Minimum wage	27.5	29.4	27.9
	8+ Minimum wage	27.3	30.1	27.9

Using the cut-off of 7 points, prevalence of CMD was 43,1%. The network analysis detected a model connected by five communities of nodes (C1, C2, C3, C4, and C5), as shown in Figure 1.

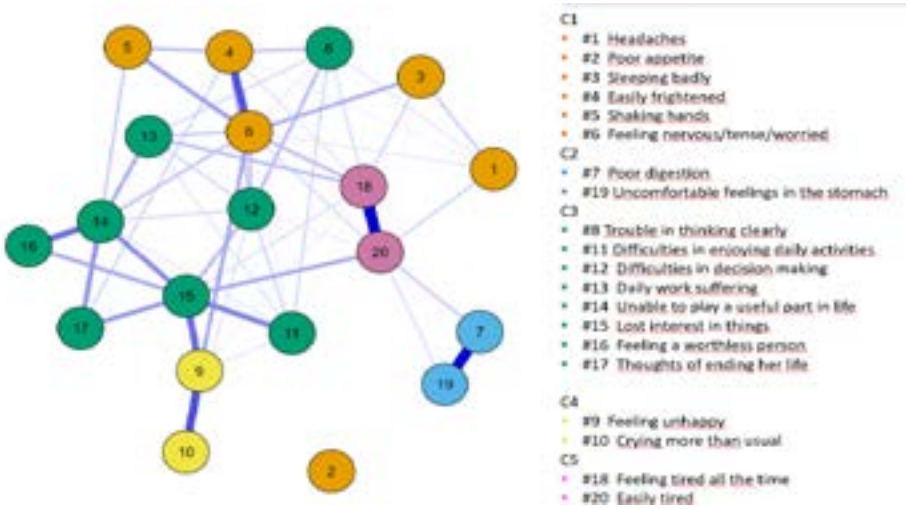

Figure 1 - *The network structure (N = 545) of the 20 items from the SRQ-20 (each node represents an item from the scale and each color represents a community). The size and density of the edges between nodes represent the strength of connectivity.*

Based on the cluster analysis of the network, five symptom communities of CMD were observed. Community 1 (C1) and Community 2 (C2) shared a common characteristic: both encompassed somatic symptoms of CMDs. However, what seemed to differentiate these two communities was that C2 exclusively discriminated somatic symptoms related to gastrointestinal disturbances (#7 poor digestion and #19 uncomfortable feelings in the stomach), which showed powerful connections with each other. At the same time, C1 included, in addition to somatic symptoms, also anxiety symptoms (shaking hands, feeling nervous, tension, etc.). Community 2 of gastrointestinal symptoms had fewer connections with the other communities in the network, while C1 was more connected to the entire network.

Depression symptoms, including suicidal ideation mainly characterized by Community 3 (C3), while Community 4 (C4) included only symptoms of sadness and crying. Community 3 and C4 had a strong connection through nodes #15 (loss of interest) and #9 (feeling unhappy).

Community 5 (C5) encompassed symptoms of fatigue and tiredness. Like C2, C5 was formed by only two nodes (#18 feeling tired all the time and #20 easily tired), which showed a strong connection with each other, along with weaker connections with the other communities in the network. Finally, node #2 (poor appetite) did not present significant connections, implying that this symptom may be statistically independent when conditioned on all other symptoms (its partial correlation is zero), or that there was insufficient power to detect an edge between these symptoms.

Regarding the description of the estimated network and the characteristics of the nodes, visually strong connections were observed between node #7 (poor digestion) and node #19 (uncomfortable feelings in the stomach), which appeared to reinforce each other but were not strongly connected to other nodes; and between node #18 (tired all the time) and node #20 (easily tired). Strong connections were also observed between node #4 (easily frightened) and node #6 (feeling nervous) and between node #9 (sadness) and node #10 (crying). Node #1 (frequent headaches) did not present strong connections with other nodes.

Subsequently, we investigated the stability of the centrality index by estimating network models based on data subsets (Figure 2). The stability of node strength appears to be acceptable when cases are reduced. This stability can be quantified using the CS coefficient. The strength (CS (cor = .7) = .439) was found to be adequate.

The centrality index, that is, the importance of nodes within the network, can be observed in Figure 3. In the network, node #6 (feeling nervous/tense/worried) and node #15 (loss of interest) showed the highest degree of strength, demonstrating that these symptoms were central to the system.

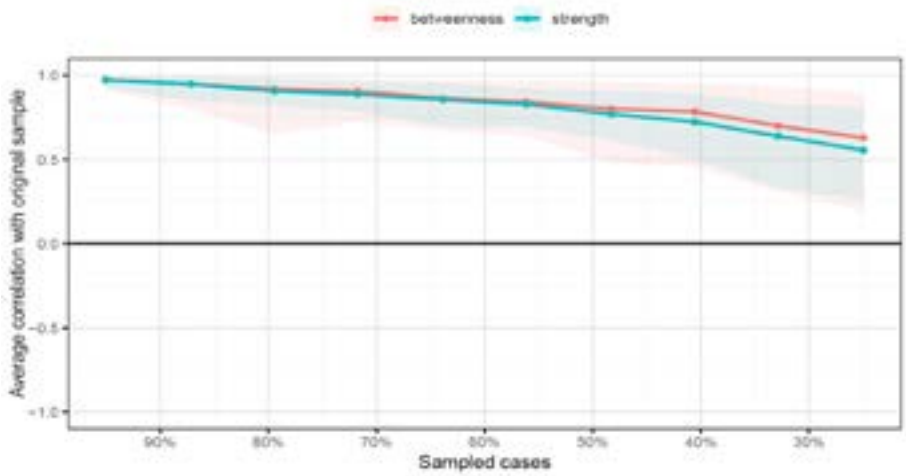

Figure 2 - *Stability of the centrality index.*

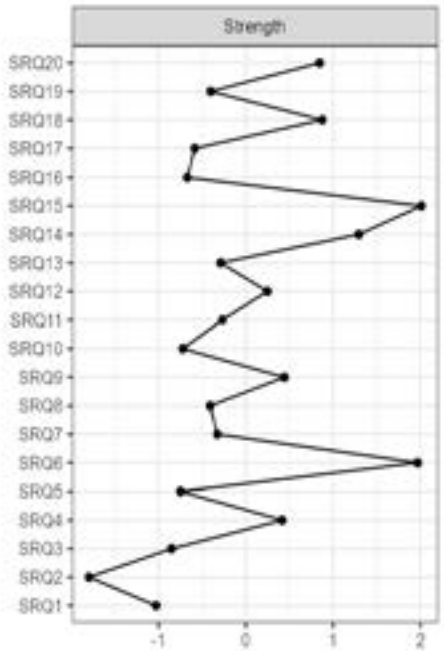

Figure 3 - *Centrality graph using standardized node strength measures.*

When comparing the networks in the subsamples of middle-aged and older women, it was found that there was no statistically significant difference in either the overall network structure (p =.32) or the global network strength (p = .31). In other words, the two networks are structurally similar, and the total strength of the connections in both subsamples can be considered comparable.

Discussion

This study provides a new estimate of the prevalence of CMD in a sample of middle-aged and older women in Brazil and employs a network approach to identify profiles of CMD symptom presentation. The results indicated that CMD symptoms are experienced in varied ways by women in this age group, with distinct relationships and predominance among the symptoms. The network analysis identified five communities of CMD symptoms in the studied group: C1, which included somatic and anxiety symptoms; C2, which comprised only gastrointestinal somatic symptoms; C3, which encompassed depressive symptoms including suicidal ideation; C4, which was formed by sadness and crying symptoms; and C5, which distinguished only fatigue symptoms. The results also indicated that symptom networks did not differ significantly between middle-aged and older women.

Feeling nervous and loss of interest were identified as central symptoms in the network, which are characteristic of anxiety and depression disorders. Similarly, the network analysis identified two specific symptom communities related to anxious (C1) and depressive (C3) states. These results, taken together, corroborate extensive literature that emphasizes anxiety and depression as important prevalent comorbidities in women (Thagunna et al., 2020; Lu et al., 2023), reinforcing the importance of considering preventive interventions for these disorders in this specific group. In addition to the expected symptoms of anxiety and depression, it is important to highlight two symptom communities that were distinguished in this analysis: the community encompassing only gastrointestinal symptoms (C2) and the community comprising fatigue symptoms (C5).

Regarding the C2 profile of gastrointestinal symptoms, there is evidence pointing to relationships between mental health and gastrointestinal health, as the gut contains neurons and communicates bi-directionally with the brain through nervous, hormonal, and immune pathways (Appleton, 2020). Therefore, dysfunctions in the gut-brain axis have been associated with various

mental health conditions, including anxiety and depression, where gastrointestinal disorders are often accompanied by symptoms of anxiety and depression (Kumar et al., 2023). This relationship may also be mediated by gender, although this is a new field of study that requires further investigation to elucidate how gender-specific factors may explain differences in the incidence of psychopathologies related to gastrointestinal disorders (Holingue et al., 2020). The new insight from this study is that gastrointestinal symptoms are less strongly related to more common mental health symptoms but may form a distinct symptom presentation in this sample.

Interventions focusing on improving diet and using probiotics may generate positive effects on mental health, suggesting a new path for mental health promotion for women with frequent gastrointestinal symptoms. This was suggested by a longitudinal study with 191 women exposed to different types of trauma, which demonstrated that higher levels of Post-Traumatic Stress Disorder (PTSD) were associated with lower adherence to a healthy diet, specifically the Mediterranean diet (Ke et al., 2023). The study showed that certain bacteria in the participants' microbiota reduced the likelihood of PTSD symptoms following trauma exposure, suggesting that interventions aimed at improving diet and microbiota are protective for women's mental health. The present study indicated that digestive symptoms should not be neglected for understanding and promoting women's mental health. Other intervention approaches besides psychological interventions may also have the potential for use in promoting mental health in older women suffering from somatic gastrointestinal symptoms.

The community composed exclusively of fatigue symptoms also highlighted that such symptoms were strongly related and which was formed a cohesive cluster, suggesting another important concern for understanding the mental health of older women. The caregiving burden and accumulation of responsibilities that fall on women have been consistently highlighted in the literature (Magal-Vardi et al., 2020; Cadet et al., 2021), with this burden seemingly persisting into later stages of the life cycle, leading to symptoms of fatigue and exhaustion and putting the mental health of these women at risk. Furthermore, biological changes expected for middle-aged women due to the climacteric phase influence mood-regulating hormone production and sleep pattern changes (Yang et al., 2020; Smith & Brown, 2022), which may partly explain why older women may experience fatigue symptoms and an overload of responsibilities.

The manifestation of C5 encompassing fatigue symptoms suggests the relevance of considering interventions aimed at reducing the burden and fatigue experienced by middle-aged and older women as a means of promoting mental health. Historically, women have been socialized to care for others and take on domestic responsibilities, which often constitute invisible and exhausting work. Added to this is the fact that in recent decades, women have needed to combine the responsibilities of informal caregiving with their formal jobs, as this group has increasingly entered the labor market. Among the various consequences, these social changes have also significantly affected the mental health of this group. Therefore, in addition to psychological interventions aimed at supporting women who often feel tired and overwhelmed, interventions at the macrosocial level are also necessary to reconsider women's roles in society concerning the accumulation of responsibilities that should be shared among all members. Accordingly, in addition to microsocial interventions, it is essential to seek changes at the macrosocial level.

Finally, it is also important to interpret the formation of C4, which includes sadness and crying symptoms. It was observed that this community bridged with C3 (a community that primarily includes depressive symptoms) through the "feeling unhappy" node. Sadness and crying in isolation do not in themselves characterize depression, however, the results of this study indicate that these symptoms may serve as important warning signs for the onset of a depressive condition,

especially frequent sadness, which was the node most strongly linked to the community of depressive symptoms.

Another important finding relates to the fact that anhedonia and sadness symptoms (which are generally central to depression diagnoses) appeared in distinct communities. It may be that for older women, these symptoms manifest in a dissociated manner, suggesting the need for a distinct perspective when there are suspicions of depressive conditions in this age group. In older age, loss of interest and pleasure is commonly observed, as opposed to the typical depressed mood, a phenomenon known as "depression without sadness" (Biella et al., 2022). In this sense, it is suggested that studies on depression in older age consider the middle-aged group to better understand depressive symptomatology in adults and older individuals and the extent to which they differ throughout aging.

Strengths of this study include a diverse sample in terms of self-reported race and gender identity, and insights into the prevalence of mental health problems with relevance for public health and family care settings. The identification of mental health symptom profiles can inform further research on the determinants of these profiles and the effectiveness of interventions to alleviate communities of mental health symptoms. The study contributes by employing a data analysis approach that allowed for an understanding of how CMD symptoms cluster in middle-aged and older women, useful for considering more targeted interventions based on the profiles identified.

It is important to note the limitations of this study. Data collection was conducted online with a convenience sample, which may have introduced some bias into the sample composition, which was predominantly more educated, therefore the results should be generalized with caution, as mental health problems may be more prevalent in participants with lower socioeconomic status.

Final considerations

This study, by adopting a network approach, aimed to identify clusters of CMD symptoms in middle-aged and older women. The analysis revealed five distinct symptom communities, highlighting the complexity of psychological distress in this group. The findings emphasize nervousness and loss of interest as central symptoms within the network's structure, corroborating the prevalence of anxiety and depression in this population. For screening purposes in primary healthcare settings, healthcare providers should remain vigilant to the expression of these symptoms and refer these women for more comprehensive evaluations, given the relevance of these symptoms in activating others within the psychological network of CMDs. The formation of specific communities for somatic symptoms, such as those related to the gastrointestinal system and fatigue, suggests the need for targeted interventions that are not only psychological but also focused on diet and intestinal health in older women, as well as macrosocial interventions that contribute to reducing the burden traditionally experienced by women.

The study observed structural similarities between the networks of middle-aged and older women, with no statistically significant differences. Therefore, we consider that, while these are age groups with specific demands, the manifestation of CMD symptoms may present similarly in these later stages of the female life cycle. Additionally, it is crucial to pay close attention to symptoms such as fatigue and exhaustion, which may be related to gender roles, resulting in caregiving burdens and exhaustion that extend throughout the life cycle. The present study underscores the urgency of preventive and interventional approaches that take into account both the specificities of these women and more complex dynamics, thus necessitating a psychosocial approach to mental health that is inseparable from living conditions.

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