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Published in:
International Journal of Geriatric Psychiatry

DOI:
[10.1002/gps.5736](https://doi.org/10.1002/gps.5736)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2022

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Bos, P., Oude Voshaar, R. C., & Hanssen, D. J. C. (2022). Prevalence and correlates of alexithymia in older persons with medically (un)explained physical symptoms. *International Journal of Geriatric Psychiatry*, 37(6). <https://doi.org/10.1002/gps.5736>

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Prevalence and correlates of alexithymia in older persons with medically (un)explained physical symptoms

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Funding information

ZonMw, Grant/Award Number: 60-61900-98-425

Abstract

Objectives: Much is unknown about the combination of Medically Unexplained Symptoms (MUS) and alexithymia in later life, but it may culminate in a high disease burden for older patients. In the present study we assess the prevalence of alexithymia in older patients with either MUS or Medically Explained Symptoms (MES) and we explore physical, psychological and social correlates of alexithymia.

Methods and Design: A case control study was performed. We recruited older persons (>60 years) with MUS ($N = 118$) or MES ($N = 154$) from the general public, general practitioner clinics and hospitals. Alexithymia was measured by the 20-item Toronto Alexithymia Scale, correlates were measured by various questionnaires.

Results: Prevalence and severity of alexithymia were higher among older persons with MUS compared to MES. Alexithymia prevalence in the MUS subgroup was 23.7%. We found no association between alexithymia and increasing age. Alexithymia was associated with depressive symptoms, especially in the MUS population.

Conclusions: Alexithymia prevalence was lower than generally found in younger patients with somatoform disorder, but comparable to studies with similar diagnostic methods for MUS. Considering the high prevalence and presumed etiological impact of alexithymia in older patients with MUS, as well as its association with depression, this stresses the need to develop better understanding of the associations between alexithymia, MUS and depression in later life.

KEYWORDS

alexithymia, case control study, medically unexplained symptoms, old age, physical symptoms, somatoform

Key points

- We examined the prevalence and physical, psychological and social correlates of alexithymia in older patients with Medically Unexplained Symptoms (MUS) compared to older patients with Medically Explained Symptoms (MES)

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- We've shown the prevalence and severity of alexithymia to be higher among older persons with MUS compared to MES and severity of alexithymia was associated with depressive symptoms, especially in the MUS population.
- The combination of MUS and alexithymia may culminate in a high disease burden in older patients which stresses the need to develop better understanding of the associations between alexithymia and MUS in later life.

1 | INTRODUCTION

Alexithymia refers to inability of finding appropriate words to describe emotions, constriction in emotional functioning, and poverty of fantasy life.¹ Alexithymia is generally considered a developmental process which starts in childhood and in adult life becomes a stable personality trait.^{2,3} Some propose a differentiation between primary alexithymia (a stable trait, influenced by genetic and familial factors); secondary alexithymia (a state or temporary response, arising after psychological stress, chronic disease and organic processes) and organic alexithymia (arising after acquired brain injury).^{4,5} Many adverse health issues are associated with alexithymia, among them depression,^{6,7} anxiety,⁸ and various somatic comorbidities.^{9,10} Despite these associations, medical professionals seem to rarely consider alexithymia during treatment.

Large ($N = 5129$ and $N = 1859$) epidemiological studies report a prevalence rate of alexithymia around 10% in the Western population.^{11,12} Among older persons, two smaller ($N = 566$ and $N = 190$) population based studies reported a prevalence of 15.2% and 34%.^{13,14} Several studies found a higher degree of alexithymia associated with a higher age,^{3,11,15,16} while other studies did not find any association with age.^{12,13,17} Therefore, both the prevalence of alexithymia in later life and its association with age remain unclear.

The idea that patients with alexithymia misinterpret physiological arousal associated with emotion as somatic symptoms¹⁸ has made alexithymia a presumed etiological factor in Medically Unexplained Symptoms (MUS). MUS are the core symptoms of somatoform disorders according to the fourth edition of Diagnostic and Statistical Manual of Mental Disorders (DSM) and can be classified as DSM-5 somatic symptom disorder if they are accompanied by excessive thoughts, feelings, and/or behaviours. Alexithymia and somatization were associated in a large sample of the general public.¹¹ Indeed, prevalence rates of alexithymia in somatoform populations are higher than those reported in population-based studies, but interpretation is difficult with ranges between 6% and 74.5%.¹⁹⁻²³ Furthermore, a meta-analysis found a relationship between alexithymia and physical symptom reporting,²⁴ but interpretation is hampered by the fact that most studies did not rigorously examine whether these reported physical symptoms were medically explained or unexplained. Although these studies collectively suggest that alexithymia might be a causal factor in MUS, findings are largely based on younger-aged populations with no or a low somatic disease burden. Therefore, it remains unknown whether this association is specific for

unexplained symptoms as well as whether results can be generalised to an older population with a higher somatic disease burden.

The limited number of studies that have been conducted on alexithymia in later life show that alexithymia is associated with higher depressive symptom severity,⁷ negative body experiences (low attractiveness, low body image, body misgivings),¹³ poorer perceived somatic health¹² and worse neuropsychological performance.¹⁶ Whether alexithymia is associated with MUS in later life has not been examined yet, but is relevant since the presence of MUS is associated with a lower health-related quality of life,²⁵ loneliness,²⁶ frailty,²⁷ and psychological distress²⁸ in older patients. In fact, the combination of MUS and alexithymia may culminate in an even higher disease burden in later life.

The objective of the present study was first to assess the prevalence of alexithymia in older patients with either medically explained or unexplained symptoms and secondly, to explore physical, psychological and social correlates of alexithymia in older aged patients with physical symptoms.

2 | METHODS

2.1 | Design and participants

This study was embedded in the Older Persons with Medically Unexplained Symptoms (OPUS) study, as described previously.²⁵ Briefly, the OPUS study is a case-control study comparing 118 older (>60 years) patients with MUS and 154 older persons suffering from Medically Explained Symptoms (MES). Participants with MUS were recruited in the community (by advertisements in local newspapers), in general practitioner clinics (primary care) and in hospitals (specialised care). Medically Explained Symptoms patients were recruited in primary care clinics among the 20% most frequently visitors and in specialised care.

MUS were defined according to the definition of MUS by the Dutch General Practitioners (GP) Guideline, that is, the presence of physical symptoms for at least 3 months for which no medical explanation can be found despite appropriate medical examination.²⁹ MES were defined as physical complaints that could be fully explained by the presence of a chronic somatic disease. The classification MUS/MES was confirmed by the patient's own GP and, if possible, reconfirmed by a clinical geriatrician.

Exclusion criteria for all participants were 1) presence of a primary psychotic disorder; 2) presence of cognitive impairment,

defined as a Mini-Mental State Examination (MMSE) total score below 19 or an established diagnosis of dementia; 3) suffering from terminal illness; 4) not mastering the Dutch language; and 5) severe auditory and/or visual limitations hindering reliable data collection.

All participants were recruited between September 2011 and March 2014 and assessed after written informed consent was obtained. Participants with MUS received a multidisciplinary (geriatrician, psychiatrist, and psychologist) biopsychosocial assessment of medical symptoms, aiding in the reconfirmation of the presence of MUS, as well as a second visit by a well-trained researcher (DH) at their homes for further data collection (especially social and cognitive functioning). Participants with MES were visited twice at home by the same researcher to administer all instruments, except for the full medical examination done by the geriatrician. The study protocol was approved by the local medical ethics committee.

2.2 | Measurements

A more detailed description and references to the instruments can be found in other OPUS study papers.^{25–28} For all used instruments, higher scores indicate a higher level of morbidity and/or symptom severity.

2.3 | Primary outcome measure

The Dutch version³⁰ of the 20-item Toronto Alexithymia Scale (TAS-20)³¹ was used to assess *alexithymia*. While the TAS-20 is a multidimensional instrument assessing difficulty identifying feelings (DIF), difficulty describing feelings (DDF) and externally oriented thinking (EOT), a total sum score ≥ 61 is considered indicative of alexithymia.³² The factorial structure of the TAS-20 has been questioned and may vary between samples, including somatoform¹⁷ and older³³ populations. Nonetheless, an exploratory maximum-likelihood factor analysis, using an oblique rotation method (Promax) and a preset number of factors (3), performed on our total sample of participants that completed the TAS-20 ($n = 253$), matched well with the original structure of the TAS-20; only one item matched with a different subscale than expected (item 10, 'being in touch with emotions is essential' matched with DDF instead of EOT; Supplementary file A).

2.4 | Physical correlates

The severity of the primary physical complaint (SPPC) was assessed with a visual analogue scale ranging from 0 (not severe at all) to 10 (very severe). *Severity of somatic comorbidity* was assessed by the self-report version of the Charlson Index, including 16 categories of somatic comorbidities. The *duration of physical complaints* (in months) was assessed by self-report. The *number of prescribed medications* was based on self-report and checked by the researcher at the

participants' home by collecting all medication containers or a list of prescribed medication from the participant's pharmacist.

2.5 | Psychological correlates

Depressive symptoms were measured with the 30-item Inventory of Depressive Symptomatology (IDS). *Anxiety* was assessed by the corresponding subscale of the 53-item Brief Symptom Inventory (BSI-53), a well-validated shortened version of the SCL-90.

Presence of hypochondriac cognitions was assessed by the Whitely Index in which 14 statements have to be answered 'yes' or 'no' with higher scores indicating more hypochondriac cognitions. The *presence of psychiatric disorders* according to criteria of the DSM-IV-TR was assessed with the Mini International Neuropsychiatric Interview (MINI, version 5.0) and categorised as any comorbid somatoform disorder, mood disorder, anxiety disorder, and/or substance use disorder. *Childhood Trauma* was assessed by a structured interview (Childhood Abuse Inventory)³⁴ to measure the occurrence and frequency of four types of childhood abuse before the age of 16 years, that is, physical abuse, sexual abuse, psychological abuse, and emotional neglect (severity score ranging from 0 to 8).

2.6 | Social correlates

Partner status (yes/no) was assessed by self-report. *Loneliness* was assessed by 'De Jong-Gierveld' scale, including an 11-item loneliness scale and a 6-item need for affiliation scale measuring need for engaging in social relationships. We assessed *social network size* with the question 'How many family members, friends, and close acquaintances are you in frequent and important contact with? Don't count household members and/or persons under 18 years of age.' Response categories were '0–1', '2–5', '6–10', '11–15', '16–20' and '>20'.

2.7 | Covariates

Sociodemographic variables were age (in years), sex, and level of education (low, average, high). Global cognitive functioning was assessed with the MMSE.

2.8 | Statistical analysis

First, we compared patients with MUS and MES regarding their sociodemographic, physical, psychological, and social characteristics in addition to prevalence and severity of alexithymia. The most clinically relevant characteristics were also compared for alexithymia status. For continuous variables we used Student *t*-tests in case of normally distributed variables and Mann Whitney U tests

in case of none-normal distributions. Categorical data were compared by Chi²-tests.

Correlates of alexithymia were assessed by multiple linear regression analyses with alexithymia as the dependent variable. For all correlates, we first checked the interaction with group status (MUS/MES). In case of significant interaction terms, results were stratified by group. We reported B-scores, Standard Errors (SE), standardised B-values (Beta values) and P-values for all linear regression analyses. R² values are used to express how much the tested model explains the variability of the TAS-20 score. Multicollinearity was checked using the variance inflation factors (VIFs) and correlation matrices. The VIFs were acceptable with a range between 1.013 and 1.856. The correlation matrices showed two cases of borderline correlation between the IDS sum score and BSI anxiety subscale in the MES subgroup ($r = 0.64$). As both the IDS and BSI have high clinical relevance, we chose to include both measures in our analyses.

For the main objective, the significance was set at a p value of < 0.01 to correct for multiple testing. All statistical analyses were performed using IBM SPSS version 23.

3 | RESULTS

3.1 | Sample characteristics

A total of 272 participants were included in the OPUS study. A detailed description of the inclusion process can be found in an earlier OPUS paper.²⁵ All MUS patients were offered a clinical, multidisciplinary biopsychosocial assessment, 41% of the patients chose a slightly altered version of the assessment performed during the planned home visits. Valid data on alexithymia was collected in 253 (93%) of the total included participants. In the remaining 7% the TAS-20 was either not administered or not fully completed, for various reasons (e.g. refusal, time-constraint, illness). To prevent bias these patients were not excluded.²⁵

The 253 participants were aged between 60 and 92 years (mean 72; SD = 7.4), and 51.8% were females. Table 1 presents patient characteristics, stratified by MUS/MES status including prevalence and severity of alexithymia. Patients with MUS, when compared to patients with MES, showed significantly lower age, higher SPPC, more depressive symptoms, higher loneliness, higher prevalence of alexithymia (23.7% vs. 6.8%), and higher TAS-20 total score.

3.2 | Characteristics of participants with alexithymia

Table 2 presents patient characteristics stratified by alexithymia (yes/no). Presence of alexithymia was associated with depressive symptom severity, anxiety, hypochondria and loneliness. No association was found between alexithymia and age, somatic comorbidity, cognitive functioning or childhood trauma. The TAS-20

total score did not significantly correlate with age ($F(31, 221) = 0.717$; $p = 0.867$).

3.3 | Correlates of alexithymia

Table 3 shows the associations between all study characteristics (correlates) and the TAS-20 total score in individual linear regression models adjusted for age, sex, level of education, and cognitive functioning. We tested for potential interaction with group status (MUS/MES) in a multiple linear regression model (corrected for age, gender, education level and cognitive functioning) using interaction terms and TAS-20 score as the dependent variable. We found significant interaction between group status and hypochondriac cognitions (interaction hypochondriac cognitions \times group (MUS/MES)): $B = 1.456$, $SE = 0.510$, $\beta = 0.253$, $p = 0.005$. And significant interaction between group status and loneliness (interaction loneliness score \times group (MUS/MES)): $B = 1.005$, $SE = 0.490$, $\beta = 0.181$, $p = 0.041$. Thus, results for psychological and social characteristics were stratified by group status (MUS/MES). Physical determinants did not differ by group status.

The TAS-20 total score was not associated with physical measures. Depressive symptoms were associated with higher TAS-20 scores for MUS patients but not MES patients. TAS-20 score was associated with higher loneliness and lower affiliation.

Combining both statistically significant correlates, that is, depressive symptoms and loneliness, in one linear regression analysis for the MUS group showed that the association with loneliness disappeared, with the beta-value of loneliness becoming 0.026 ($B = 0.102$; $SE = 0.48$; $t = 0.213$; $p = 0.832$).

3.4 | Correlates of specific alexithymia dimensions

Table 4 presents the correlates of the three subscales of the TAS-20. The DIF score was significantly associated with SPPC and depressive symptoms in both patients with MUS and MES. In a linear regression analysis exploring these correlates simultaneously depressive symptoms remained associated with DIF for the total group (MUS + MES) but SPPC lost significance with the beta-value of SPPC being 0.058 ($B = 0.14$; $SE = 0.17$; $t = 0.79$; $p = 0.43$). The DDF-score was significantly associated with loneliness in the MUS patients. The EOT score was significantly associated with loneliness and lower affiliation scores.

4 | DISCUSSION

4.1 | Principal findings

Prevalence and severity of alexithymia were higher among older persons with MUS compared to MES. Nonetheless, the alexithymia prevalence of 23.7% in the MUS subgroup is much lower than

TABLE 1 Patient characteristics, stratified by MUS/medically explained symptoms (MES) status

		MUS (N = 118)	MES (N = 154)	r/U/ χ^2 (df)	p
General characteristics					
• Age	Mean (SD)	70.5 (6.7)	73.4 (7.7)	3.285 (265)	0.001 ^a
• Female	% (N)	64.4 (76)	43.5 (67)	11.7 (1)	0.001 ^b
• Education					
Lower	% (N)	26.8 (29)	17.8 (27)		
Average	% (N)	45.4 (49)	52.6 (80)		
Higher	% (N)	27.8 (30)	29.6 (45)	3.166 (2)	0.205 ^b
Physical characteristics					
• Severity primary physical complaint (VAS)	Mean (SD)	6.1 (1.5)	4.6 (2.6)	-5.22 (194)	<0.001 ^a
• Somatic comorbidity (Charlson index)	Mean (SD)	1.2 (1.5)	1.73 (1.9)	2.40 (258)	0.017 ^a
• Cognitive functioning (MMSE)	Mean (SD)	28.1 (2.2)	28.2 (1.9)	0.28 (248)	0.781 ^a
• Duration of physical complaints (months)	Mean (SD)	146.7 (195.7)	105.3 (166.8)	2592	0.001 ^c
• Number of medications in use	Mean (SD)	5.0 (3.3)	5.3 (3.0)	0.656 (214)	0.512 ^a
Psychological characteristics					
• Depressive symptoms (IDS)	Mean (SD)	20.7 (12.3)	15.4 (9.3)	-3.42 (136)	0.001 ^a
• Anxiety (BSI)	Mean (SD)	4.7 (4.4)	2.2 (3.3)	-3.7 (233)	0.003 ^a
• Somatoform disorder DSM-IV	% (N)	46.6 (55)	9.1 (14)	49.3 (1)	<0.001 ^b
• Mood disorder DSM-IV	% (N)	22.9 (27)	23.5 (36)	0.063 (1)	0.900 ^b
• Anxiety disorder DSM-IV	% (N)	15.3 (18)	11.1 (17)	0.067 (1)	0.313 ^b
• Substance use disorder DSM-IV	% (N)	2.5 (6)	2.0 (3)	2.025 (1)	0.155 ^b
• Hypochondria severity (Whitely index)	Mean (SD)	3.8 (3.2)	2.5 (2.5)	-3.521 (192)	0.001 ^a
• Childhood trauma score	Mean (SD)	0.70 (1.5)	0.51 (1.3)	6275.5	0.347 ^c
Social characteristics					
• Partner (yes)	% (N)	60.6 (66)	60.5 (92)	0.00 (1)	0.997 ^b
• Loneliness score	Mean (SD)	3.2 (3.4)	2.2 (2.5)	-2.99 (249)	0.012 ^a
• Affiliation score	Mean (SD)	3.2 (1.8)	3.0 (1.7)	-0.925 (256)	0.356 ^a
• Social network size					
0-1 persons	% (N)	4.5 (5)	2.9 (2/146)		
1-5 persons	% (N)	18.0 (20)	15.7 (22-146)		
6-10 persons	% (N)	13.5 (15)	18.1 (27/146)		
11-15 persons	% (N)	14.5 (16)	14.7 (22/146)		
16-20 persons	% (N)	10.8 (12)	13.7 (21/146)		
>20 persons	% (N)	38.7(43)	34.8 (52/146)	4.379 (5)	0.496 ^b
TAS-20 total- and subscale scores					
• TAS-20 score, dichotomous (≥ 61)	% (N)	26.4 (28)	6.8 (10)	18.6 (1)	<0.001 ^b
• TAS-20 total score, dimensional	Mean (SD)	51.0 (12.9)	46.4 (9.7)	3.3 (250)	0.001 ^a
• Difficulty describing feelings (max score = 25)	Mean (SD)	12.9 (5.2)	12.7 (4.11)	0.2 (252)	0.81 ^a
• Difficulty identifying feelings (max score = 35)	Mean (SD)	16.1 (5.8)	12.2 (5.05)	5.7 (253)	<0.001 ^a
• Externally oriented thinking (max score = 40)	Mean (SD)	21.5 (5.4)	22.0 (6.02)	0.7 (252)	0.48 ^a

Abbreviations: BSI, brief symptom inventory; IDS, inventory of depressive symptomatology; MES, medically explained symptoms; MMSE, mini-mental state examination; MUS, medically unexplained symptoms; VAS, visual analogue scale.

^aSignificance values derived from independent samples *t* tests.

^bSignificance values derived from χ^2 tests.

^cSignificance values derived from Mann-Whitney U tests.

TABLE 2 Patient Characteristics, stratified by alexithymia status (toronto alexithymia scale (TAS-20) score ≥ 61 = alexithymic)

		Alexithymic (N = 38)	Non-alexithymic (N = 215)	r/U/ $\times 2$ (df)	p
General characteristics					
• Age	Mean (SD)	70.66 (7.1)	72.22 (7.5)	1.197 (251)	0.233 ^a
• Female	% (N)	52.6 (20)	51.6 (111)	0.013 (1)	0.909 ^b
Physical characteristics					
• Severity primary physical complaint (VAS)	Mean (SD)	5.7 (0.18)	5.0 (0.38)	-1.3 (197)	0.191 ^a
• Somatic comorbidity (Charlson index)	Mean (SD)	1.67 (2.3)	1.45 (1.7)	-0.69 (248)	0.493 ^a
• Cognitive functioning (MMSE)	Mean (SD)	27.60 (2.6)	28.26 (1.9)	1.843 (243)	0.067 ^a
• Duration of physical complaints	Mean (SD)	155.2 (190)	112.8 (175.2)	1511	0.118 ^c
• Number of medications in use	Mean (SD)	5.19 (3.71)	5.15 (2.93)	-0.063 (208)	0.950 ^a
Psychological characteristics					
• Depressive symptoms (IDS)	Mean (SD)	28.4 (14.2)	15.4 (8.7)	-6.8 (218)	<0.001 ^a
• Anxiety (BSI)	Mean (SD)	4.7 (4.4)	2.2 (3.3)	-3.7 (233)	<0.001 ^a
• Hypochondria severity (Whitely index)	Mean (SD)	4.4 (2.99)	2.8 (2.7)	-3.3 (248)	0.001 ^a
• Childhood trauma score	Mean (SD)	0.47 (1.1)	0.61 (1.4)	3650.5	0.925 ^c
Social characteristics					
• Partner (yes)	% (N)	63.2 (24)	60.6 (129)	0.091 (1)	0.763 ^b
• Loneliness score	Mean (SD)	3.89 (3.3)	2.38 (2.8)	-2.99 (249)	0.003 ^a
• Affiliation score	Mean (SD)	2.3 (1.8)	3.3 (1.8)	3.136 (250)	0.002 ^a

Abbreviations: BSI, brief symptom inventory; IDS, inventory of depressive symptomatology; MMSE, mini-mental state examination; VAS, visual analogue scale.

^aSignificance values derived from independent samples *t* tests.

^bSignificance values derived from χ^2 tests.

^cSignificance values derived from Mann-Whitney U tests.

generally found in younger patients with somatoform disorders.^{19–23} Within our group, we found no association between alexithymia and (increasing) age (Severity of) alexithymia was only associated with loneliness and depressive symptoms, the latter especially in the MUS population.

4.2 | Strengths and limitations of the current study

To our knowledge, this is the first study on alexithymia among older persons with medically (un)explained symptoms. A strength of our study is the thorough evaluation of medical symptoms with each participants' GP confirming the MUS diagnosis, aided by reconfirmation due to the comprehensive geriatric assessment. Although 41% of the MUS-patients refused the clinical assessment, researchers (qualified to perform the assessment due to training) conducted all but one of the components of this assessment, with exclusion of the Cumulative Illness Rating Scale (CIRS-G), during the home visits of these participants.²⁵ Thus, loss of data regarding medical symptoms was minimal. A second strength is the use of a broad range of well-validated questionnaires to explore the biopsychosocial correlates of alexithymia in later life in one study.

Finally, severity of illness could not confound our results as the severity of the primary complaint did not differ between patients with MUS and MES.²⁵

The use of the TAS-20 can be considered as strength as well as a limitation. In a recent literature review by the developers of the TAS-20, it was concluded that the TAS-20 meets the criteria to assess alexithymia accurately.³⁵ Nonetheless, the validity of a self-report measure to assess alexithymia may be limited by the inherent lack of ability to describe what is being measured in true alexithymic patients and its association with negative affect.³⁶ The latter limitation may result in possible false-positive alexithymic responses. Semi-structured interviews and/or observer-rated scales might be preferred over a self-report measure.^{15,37,38} Meta-analysis shows that the observer-rated Levels of Emotional Awareness Scale barely correlated with the TAS-20 sum score ($r = 0.12$, $p < 0.001$ ³⁷). A small study found a moderate correlation ($r = 0.43$, $p < 0.01$) between the semi-structured Affect Consciousness interview sum score and TAS-20 sum score.³⁸ These results suggest that self-report and observer-rated measures of alexithymia are complementary to one another. In that respect, the absence of an observer rated instrument in our study is a limitation.

TABLE 3 Associations between total toronto alexithymia scale (TAS-20) score and physical, psychological and social measures in older medically unexplained symptoms (MUS) and medically explained symptoms (MES) patients (N = 253)

Outcomes ^{a,b}	B (SE)	Beta	p	R ²
Physical measures in total group (N = 173)				0.110
• Severity primary physical complaint (VAS)	0.39 (0.39)	0.08	0.32	
• Somatic comorbidity (Charlson index)	-0.07 (0.43)	-0.01	0.88	
• Duration of complaints (months)	-0.002 (0.005)	-0.03	0.73	
Psychological measures in MUS (N = 67)				0.313
• Depressive symptoms (IDS)	0.40 (0.15)	0.38	0.01	
• Anxiety (BSI)	0.26 (0.39)	0.09	0.51	
• Trauma (nesdo trauma score)	-0.90 (0.95)	-0.11	0.35	
• Hypochondria severity (Whitely index)	0.76 (0.54)	0.19	0.16	
Psychological measures in MES (N = 124)				0.144
• Depressive symptoms (IDS)	0.24 (0.13)	0.22	0.07	
• Anxiety (BSI)	0.11 (0.39)	0.03	0.78	
• Trauma (nesdo trauma score)	0.37 (0.73)	0.05	0.61	
• Hypochondria severity (Whitely index)	-0.11 (0.41)	-0.03	0.79	
Social measures- MUS (N = 93)				0.256
• Loneliness (loneliness and affiliation scale)	0.79 (0.33)	0.05	0.003	
• Affiliation (loneliness and affiliation scale)	-0.92 (0.49)	-0.17	0.02	
• Social network size				
Small network (<5)	-0.64 (2.43)	-0.02	0.50	
Large network (>20)	-0.41 (1.92)	-0.02	0.63	
Social measures- MES (N = 135)				0.124
• Loneliness (loneliness and affiliation scale)	1.12 (0.39)	0.29	0.53	
• Affiliation (loneliness and affiliation scale)	-1.75 (0.71)	-0.25	0.02	
• Social network size				
Small network (<5)	-2.43 (3.62)	-0.08	0.79	
Large network (>20)	1.39 (2.90)	0.05	0.83	

Abbreviations: BSI, brief symptom inventory; IDS, inventory of depressive symptomatology; MES, medically explained symptoms; MMSE, mini-mental state examination; MUS, medically unexplained symptoms; SE, standard errors; VAS, visual analogue scale.

^aAssociations examined using linear regression analyses and adjusted for demographic variables (age, gender, level of education) and cognitive functioning (MMSE).

^bp-value <0.01 is regarded as statistically significant to correct for multiple testing.

A second limitation of our study is the relatively small sample size. Testing multiple correlations may easily result in false-positive findings. On the other hand a more stringent *p*-value may result in false-negative findings, which should be precluded in an explorative first study like this. Thirdly, the sample is not representative of the general population as patients were recruited across different settings (population, primary care, specialised health care). The strength of this recruitment strategy, however, is the inclusion of whole severity spectrum of MUS and MES in later life. Fourthly, by excluding patients with an MMSE score below 19 we might have masked previously reported associations between alexithymia in older age and worse neuropsychological performance.^{16,39} Not performing neuroimaging is a subsequent limitation, as this would have been relevant for both

differential diagnostics and exploring associations between alexithymia and cognitive functioning. Fifthly, future research would benefit from more specific detailing of participants' somatic comorbidities and medication (types + dosages). To explore associations between them, but also correct for possible interaction as (side) effects of medication and symptoms of comorbidities could potentially mimic alexithymic traits. Finally, our cross-sectional design precludes causal interpretation. Nonetheless, considering alexithymia as stable personality trait developed early in life, the identified correlates of alexithymia might be interpreted as consequences of alexithymia. In future research, a longitudinal research design would be appropriate to distinguish between primary and secondary alexithymia and to assess the interaction between alexithymia and correlates over time.

TABLE 4 Associations between toronto alexithymia scale (TAS-20) subscale score and physical, psychological and social measures in older medically unexplained symptoms (MUS) and medically explained symptoms (MES) patients (N = 253)^{a,b}

Outcomes	Difficulty identifying feelings			Difficulty describing feelings			Externally oriented thinking					
	B (SE)	Beta	p	R ²	B (SE)	Beta	p	R ²	B (SE)	Beta	p	R ²
Physical measures - Total group												
	0.60 (0.20)	0.24	0.003	0.114	0.14 (0.17)	0.07	0.40	0.038	-0.36 (0.20)	-0.14	0.08	0.151
• Severity primary physical complaint (VAS)	0.15 (0.22)	0.05	0.49		-0.32 (0.18)	-0.14	0.09		0.10 (0.22)	0.03	0.66	
• Somatic comorbidity (Charlson index)	<-0.01 (0.002)	-0.02	0.75		<-0.01 (0.002)	-0.001	0.99		-0.001 (0.002)	-0.03	0.72	
• Duration of complaints (months)	Psychological measures - MUS											
	0.21 (0.07)	0.48	0.001	0.366	0.11 (0.07)	0.25	0.10	0.295	0.06 (0.07)	0.12	0.42	0.255
• Depressive symptoms (IDS)	0.10 (0.18)	-0.01	0.47		0.24 (0.17)	0.19	0.16		0.15 (0.18)	0.12	0.40	
• Anxiety (BSI)	<0.01 (0.43)	0.001	0.99		-0.61 (0.42)	-0.17	0.15		-0.29 (0.43)	-0.08	0.50	
• Trauma (nesdo trauma score)	0.48 (0.24)	0.26	0.05		0.35 (0.27)	0.20	0.14		-0.07 (0.24)	-0.04	0.78	
• Hypochondriac associations (Whitely index)	Psychological measures - MES											
	0.17 (0.06)	0.32	0.004	0.261	0.16 (0.06)	0.29	<0.02	0.074	-0.07 (0.07)	-0.17	0.34	0.106
• Depressive symptoms (IDS)	0.34 (0.18)	0.20	0.06		-0.15 (0.17)	-0.11	0.36		-0.09 (0.21)	-0.05	0.66	
• Anxiety (BSI)	-0.03 (0.34)	-0.01	0.94		0.14 (0.31)	0.04	0.65		0.26 (0.39)	0.06	0.51	
• Trauma (nesdo trauma score)	0.08 (0.19)	0.037	0.66		0.18 (0.18)	0.07	0.47		-0.30 (0.22)	-0.13	0.17	
• Hypochondriac associations (Whitely index)	Social measures - MUS											
	0.21 (0.18)	0.12	0.26	0.081	0.46 (0.17)	0.28	0.007	0.160	0.52 (0.18)	0.27	0.004	0.340
• Loneliness (loneliness and affiliation scale)	-0.49 (0.33)	-0.17	0.15		-0.57 (0.30)	-0.21	0.06		-0.69 (0.32)	-0.21	0.04	
• Affiliation (loneliness and affiliation scale)	0.18 (1.70)	0.01	0.91		-0.38 (1.5)	-0.03	0.81		-1.87 (1.63)	-0.13	0.26	
• Social network size	-0.36 (0.36)	-0.03	0.79		0.98 (1.2)	0.09	0.43		-0.77 (1.31)	-0.06	0.56	
Small network (<5)	Social measures - MES											
	0.4 (0.17)	0.2	0.02	0.113	0.19 (0.14)	0.12	0.18	0.065	-0.39 (0.17)	-0.18	0.03	0.203
Large network (>20)	0.37 (0.25)	0.13	0.15		-0.34 (0.21)	-0.15	0.11		-0.95 (0.26)	-0.31	<0.001	
• Loneliness (loneliness and affiliation scale)	-0.21 (1.3)	-0.014	0.87		-0.04 (1.1)	-0.003	0.97		-0.42 (1.28)	-0.03	0.74	
• Affiliation (loneliness and affiliation scale)	-0.75 (1.0)	-0.07	0.46		1.24 (0.84)	0.14	0.14		-0.86 (1.01)	-0.08	0.40	
• Social network size	Social measures - MUS											
Small network (<5)	Social measures - MES											
	0.4 (0.17)	0.2	0.02	0.113	0.19 (0.14)	0.12	0.18	0.065	-0.39 (0.17)	-0.18	0.03	0.203
Large network (>20)	0.37 (0.25)	0.13	0.15		-0.34 (0.21)	-0.15	0.11		-0.95 (0.26)	-0.31	<0.001	
• Loneliness (loneliness and affiliation scale)	-0.21 (1.3)	-0.014	0.87		-0.04 (1.1)	-0.003	0.97		-0.42 (1.28)	-0.03	0.74	
• Affiliation (loneliness and affiliation scale)	-0.75 (1.0)	-0.07	0.46		1.24 (0.84)	0.14	0.14		-0.86 (1.01)	-0.08	0.40	
• Social network size												

Abbreviations: BSI, brief symptom inventory; IDS, inventory of depressive symptomatology; MES, medically explained symptoms; MMSE, mini-mental state examination; MUS, medically unexplained symptoms; SE, standard errors; VAS, visual analogue scale.

^aAssociations examined using linear regression analyses and adjusted for demographic variables (age, gender, level of education) and cognitive functioning (MMSE).

^bp-value <0.01 is regarded as statistically significant to correct for multiple testing.

4.3 | Comparison with literature

The huge variation in reported prevalence rates of alexithymia in somatoform patients can be partly explained by methodological differences, including the measurement of alexithymia, methods of diagnosing MUS, and patient characteristics like cultural background and different age ranges. Unfortunately, other studies including exclusively older patients with MUS are lacking. In our opinion, the relatively low prevalence of alexithymia in our age group can be explained by our rigorous examination of MUS/MES status and is less likely a true age effect. Most studies in younger age groups assessed MUS by self-report, extracted diagnoses from medical files or did not describe their procedures at all. Studies that reported prevalence rates comparable to ours (20%–27%) had applied comparable inclusion criteria, a similar recruitment strategy, or similar diagnostic procedures including a physical examination.^{19,20,23} Interestingly, a Dutch study with similar methodology, comparing alexithymia in patients aged 18–65 years with either MUS or MES, found nearly similar prevalence rates in younger patients with MUS, that is, 20%, but an almost double prevalence rates in patients with MES, that is, 13%.²³ This may suggest that alexithymia is a contributing factor to the emergence of MUS in one in four or 5 patients irrespective of age. When taking this stable alexithymia prevalence over time into account together with the findings that MUS prevalence in later life is lower compared to younger populations,⁴⁰ this might suggest older patients cope with alexithymia differently that is, not resulting in MUS or that alexithymia presents differently in later life. These differences may in part also explain the inconsistencies in the findings regarding the association of alexithymia and ageing in different types of populations, with some finding positive associations,^{11,15,16} only finding an increase of alexithymia in the oldest age group (75–97 years³) and some finding no association.^{12,13,17} Whether increasing prevalence rates of alexithymia across age groups is a true age effect or a cohort effect is also a matter of debate.³

In contrast to previous studies, we could not confirm the often presumed associations between alexithymia with childhood trauma, anxiety, and (severity of) somatic comorbidities.^{2,8–10} If these results would be replicated, it may imply that the effect of childhood trauma on the development of alexithymia may either decrease with ageing and/or persons with the most severe levels of childhood trauma may not survive in old age.⁴¹ The lack of any association with somatic morbidities may be explained by competing risk due to the onset of several chronic somatic diseases with ageing, which may dilute the specific association with alexithymia. The association between alexithymia and depression has been reported often, both in a meta-analysis as well as a study on middle-aged and older persons.^{6,7} Depression seems particularly associated with the emotional components of alexithymia (DIF + DDF subscales). This can be explained by the fact that a deficit in DIF or DDF may lead to inadequate coping strategies⁷; impairment in recognising and describing emotions possibly leads to depressive symptoms being interpreted as physical symptoms, and subsequently being misinterpreted as physical illness.⁶ This is in line with our finding that depressive symptoms were associated with DIF for both MUS and MES, but not DDF or EOT. Since the association between alexithymia

and loneliness disappears when additionally adjusted for depression, future longitudinal studies should explore whether alexithymia results in depression mediated by loneliness or vice versa alexithymia results in depression mediated by loneliness, possibly impacting recommendations for (order of) treatment.

4.4 | Final implications

Considering the presumed etiological impact of alexithymia in older patients with MUS, as well as its association with depression, assessing alexithymia in this vulnerable patient group should be considered by clinicians. Further research on the causal relationship between alexithymia and depression in older age is necessary to better advice in order of treatment. Although some have shown the burden of alexithymia might be improved by various psychological based interventions,⁴² treatment strategies to decrease alexithymia in later life are lacking.

AUTHOR CONTRIBUTIONS

Pauline Bos performed the analyses and was responsible for writing the manuscript. Richard C. Oude Voshaar was responsible for the study design and supervised the analyses and writing of the manuscript. Denise J. C. Hanssen was responsible for the data collection and supervised the writing of the manuscript. All authors were involved in the writing of the research plan and read and approved the final manuscript.

ACKNOWLEDGEMENTS

This study was supported by the National Care of the Elderly Programme, as part of the Netherlands Organisation for Health Research and Development (ZonMW); grant number 60-61900-98-425.

CONFLICT OF INTEREST

The authors report no conflicts with any product mentioned or concept discussed in this article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

- The data has not been published elsewhere or been previously presented orally or by poster at scientific meetings.
- No Disclosures to report.
- Written informed consent was obtained from all participants.
- The study protocol was approved by the local medical ethics committee.

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SUPPORTING INFORMATION

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How to cite this article: Bos P, Oude Voshaar RC, Hanssen DJC. Prevalence and correlates of alexithymia in older persons with medically (un)explained physical symptoms. *Int J Geriatr Psychiatry.* 2022;1-11. <https://doi.org/10.1002/gps.5736>