Middle East Current Psychiatry

RESEARCH

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Alexithymia, oral behaviors, and temporomandibular disorders: a dark triad?

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Abstract

Background Alexithymia is a condition in which cognitive processing of emotions is impaired. Associations between alexithymia and temporomandibular disorders (TMD) have been described in multiple studies, yet the coexistence or influence of oral behaviors has never been addressed. This study aimed to clarify the relationship between alexithymia, oral behaviors, and temporomandibular pain disorders.

Results A total of 264 participants were included in this study. The mean age was 25.70 ± 5.99 years, with a range from 18 to 65 years. Eighty-two (31.1%) were possibly alexithymic, and 93 (35.2%) were alexithymic. A total of 12.5% of the participants were at high risk for TMD. With respect to oral behavior risk, 62.5% were at low risk, and 35.2% were at high risk. Alexithymia appeared to be a positive predictor of TMD risk ($p < 0.001$). Participants with high-risk oral behaviors were found to have an increased likelihood of TMD risk ($p < 0.001$). Moreover, both high-risk oral behavior and alexithymia correlated with increased somatic symptom burden levels ($p < 0.001$). Pain disorders exert significant distress on individuals and lead to poorer quality of life.

Conclusion Understanding the association of alexithymia, somatic symptom burden, and coping strategies with oral behaviors and temporomandibular pain disorders can help improve the management of this condition. By tailoring the chosen therapy to the dominant co-existing psychosocial comorbidities in TMD patients, the risk of treatment failure or relapse may be diminished.

Keywords Temporomandibular disorders, Alexithymia, Oral parafunctions, Oral behaviors, Oral habits, Somatization, Somatic symptom, Lebanon

Background

Alexithymia, a complex condition wherein individuals struggle to articulate their emotions, is primarily characterized by a disruption in the cognitive processing of emotions [1]. This distinctive personality construct denotes a profound deficit or incapacity to identify, differentiate, or express emotions, often confounding emotional states with physical ones [2]. Current estimates suggest that alexithymia affects approximately 10% of the general population [3]. A substantial body of research links alexithymia to a range of physical symptoms, psychosomatic illnesses, and mental disorders. Intriguingly, a growing number of studies have identified a noteworthy association between specific pain disorders, such as migraines and temporomandibular disorders (TMD) and the hallmark features of alexithymia [4].

TMD holds the distinction of being the second most common cause of orofacial musculoskeletal pain, trailing only chronic low back pain [5]. It encompasses a varied collection of neuromuscular and musculoskeletal disorders, impacting the hard and soft tissues of the temporomandibular joint, as well as its surrounding muscular and skeletal structures [6]. Traditionally, dental occlusion was presumed to be a primary factor linked to TMD.

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However, most experts now lean toward a multifactorial approach, acknowledging that a combination of biological, behavioral, and cognitive factors contributes to the manifestation of TMD symptoms. This paradigm shift underscores the importance of the biopsychosocial model in understanding TMD, mirroring the approach taken for other chronic pain disorders [7–9]. Contributing factors to TMD symptoms include diverse aspects like joint trauma—which may be precipitated by injuries to the jaw or joint overload due to oral behaviors—and altered pain perception possibly associated with central sensitization in TMD patients, leading to heightened neural signaling in the central nervous system in response to normal or subthreshold stimuli [10, 11]. Particularly noteworthy are the reports that identify a correlation between oral behaviors and TMD. These behaviors, which are habits performed outside the normal functions of the mouth like mastication, phonation, breathing, and swallowing, have the potential to instigate or exacerbate TMD. Encompassing a range of both conscious actions (like gum chewing) and unconscious ones (such as teeth clenching), these behaviors may transpire during wakefulness or sleep [12]. Research has shown that oral behaviors are markedly more prevalent among TMD patients compared to those without the condition [13, 14]. Certain theorists propose a causative correlation between TMD and these habits, positing that pain or even TMD may be a downstream consequence of such behaviors on masticatory structures. This could ultimately precipitate dysfunction in the stomatognathic system and disorders of peripheral nociception [15, 16]. The roots of these oral behaviors are multifaceted as per the literature and can be shaped by a myriad of factors, such as emotional and psychological disturbances or disorders within an individual [17, 18].

Various studies have described a positive association between alexithymia and TMD in community-based and clinical settings. The largest Northern Finland Birth Cohort study found higher alexithymia rates among patients with painful TMD than asymptomatic ones [4]. Also, Meldolesi et al. showed that little awareness of inner states and emotions is present among people with TMD [19]. In fact, it was shown that stressful experiences exert a strong effect on patients with TMD, specifically with respect to the severity and intensity of oral behavior [20]. It is unclear how these two conditions interact until now, and the underlying mechanism has not been investigated, yet it is hypothesized that alexithymia may contribute to both functional symptoms and an increase in oral behaviors [21].

Nevertheless, the bulk of the literature on alexithymia and TMD has only examined the relationship between alexithymia and pain in TMD patients, without considering the presence of oral behaviors, somatic symptom burden levels, or coping strategies in the target population. Moreover, there is still a paucity of alexithymia as well as TMD research in Lebanon. Thus, in this study, we aimed to investigate the association between alexithymia, oral behaviors, and the risk of TMD among a sample from the general population in Lebanon.

Materials and methods

Study design and population

This study was a community-based cross-sectional survey targeting the general population in Lebanon between January and May 2022. The study included Lebanese adults aged 18 and above from all governorates of Lebanon. The exclusion criteria included no knowledge of English language and digital illiteracy. For recruitment, the questionnaire was set up online on LimeSurvey (LimeSurvey GmbH, Hamburg, Germany), and an invitation was disseminated via social media with a convenience snowball sampling. Electronic consent was obtained from all participants. The Ethical Committee of the Neuroscience Research Center approved the conduct of this study.

Minimal sample size calculation

According to Cochran's formula, with a prevalence of 20.8% of alexithymia in Lebanon [22] and a 95% confidence level, the minimal sample size needed was 253.

Questionnaire

The questionnaire consisted of 65 closed-ended questions, in English language, divided into six sections:

a. Sociodemographic characteristics that included age, gender, residence location, marital status, educational level, and monthly income
b. Toronto Alexithymia Scale-20 (TAS-20)
   - The most widely used, self-reported measure of alexithymia is the Toronto Alexithymia Scale-20 (TAS-20), published by Bagby and colleagues in 1994 [23]. TAS-20 is a 20-item scale that captures three-factor elements of "difficulties describing feelings (DDF)," "difficulties identifying feelings (DIF)," and "externally oriented thinking (OET)." The TAS-20 is scored in a 5-point Likert manner with a score ranging from 0 to 100. A score of ≤ 51 = no alexithymia, 52–60 = possible alexithymia, and ≥ 61 = alexithymia. For those with a positive result, greater scores reveal greater levels of alexithymia [23].
c. Somatic Symptom Scale-8 (SSS-8)
   - The Somatic Symptom Scale-8 (SSS-8) was derived from the Patient Health Questionnaire-15 (PHQ-15) and developed as a brief 8-item version and

self-reported measure of somatic symptom burden [24]. It was first established as a reference measure for the *Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5)* to investigate the newly added somatic symptom disorder [25]. Answers were graded on a 5-point response option (0–4), with higher scores indicating higher somatic symptom burden [26].

d. Brief Resilient Coping Scale

- The Brief Resilient Coping Scale (BRCS) is a reliable and validated 4-item measure that describes the individual's abilities to cope with stress in an adaptive manner. It is a self-reported scale that has positive correlations with psychological well-being and pain-coping behaviors. It is based on a 5-point scale (1–5), with a higher score revealing higher resilient coping [27].

e. Oral Behavior Checklist-21 (OBC-21)

- The Oral Behavior Checklist-21 (OBC-21) instrument was initially developed by Ohrbach and the RDC/TMD Validation Project group [28] and later expanded. It is a self-report scale that consists of a 21-question checklist on oral behaviors divided into two parts: (1) oral behaviors during sleep (2 questions) and (2) oral behaviors during waking hours (19 questions). It identifies and quantifies the frequency of oral behaviors activity in an individual over a period of 1 month. Each question is scored on a 5-Likert-type scale as 0 (none of the time) to 4 (all of the time) with a total score ranging between 0 and 84. The scores are interpreted as follows: no risk grade (0), moderate risk grade (1–24), and high-risk grade (> 25).

f. TMD-Pain Screener (full version)

- It is a practical, brief self-report instrument that screens for temporomandibular disorder pain [29]. The full version has six items, with the first scored as 0–2 (a = 0, b = 1, or c = 2), while the rest as 0–1 ($a = 0$ or $b = 1$). A threshold value of above 3 indicates that TMD may be present. Although it depicts pain-related TMD, it was shown to be accurate in detecting non-painful TMD as well [29–31].

Statistical analyses

Data entry and statistical analyses were conducted using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as mean ± standard deviation for continuous variables and as frequencies and percentages for categorical variables. The normality of the distribution was assessed using graphical plots. The chi-square test was used to evaluate differences within each variable and to test for associations between categorical variables. Depending on the nature of the data, suitable parametric or nonparametric tests were employed to evaluate associations and test hypotheses. Regression models were used to assess predictors of TMD risk and examine the relationships between alexithymia, somatic symptom burden, coping strategies, and oral behaviors. The level of significance was set at $\alpha = 0.05$.

Results

Overall participant characteristics

During the study period, a total of 264 participants who met the eligibility criteria completed the survey. The mean age was 25.70 ± 5.99 years, with ages ranging from 18 to 65 years. Among the participants, 61.7% were female, and the majority resided in the Beirut and Mount Lebanon governorates, at 38.3% and 36.7%, respectively. The participants' sociodemographic characteristics are summarized in Table 1.

Physical and psychological symptoms

Table 2 presents the prevalence of alexithymia, somatic symptom burden, brief resilience coping abilities, TMD risk, and oral behavior among the sample population. According to the clinical cutoffs of the TAS-20, 89 (33.7%) suggested alexithymia, 82 (31.1%) were possible alexithymic, and 93 (35.2) were alexithymic. Concerning the somatic symptom burden among the sample population, 25.0% were at very high risk. Along similar lines, the majority of the participants (48.9%) had low brief resilience coping abilities. A total of 12.5% of the participants had high TMD risk. With respect to oral behavior risk, 1.9% had no-risk grade, 62.7% had low-risk grade, and 35.4% had high-risk grade.

Significant correlation was observed between alexithymia and TMD-risk scores yet with a weak positive correlation. OBC score was significantly associated with TMD-risk score, with a good positive correlation (Table 3).

Results of the multivariable logistic and linear regressions are presented in Tables 4, 5 and 6 for alexithymia, OBC, and TMD, respectively. Interestingly, any somatic symptom burden level above a low category significantly affected alexithymia score; in fact, increasing estimate (B) was observed with the increased level of somatic symptom burden, which means the higher the somatic symptom burden level (per the SSS scale), the higher the alexithymia score. Moreover, coping scale significantly correlated with alexithymia score. Medium and high coping categories were significant predictors of decreased alexithymia score, as compared with low coping scale category. Neither age, sex, nor the interaction between them seemed to influence alexithymia score. As seen in model 2 (Table 4), participants with

Table 1 Baseline sociodemographic characteristics of the sample

Characteristic	*N* = 264
	Mean ± SD
Age (years)	25.70 ± 5.99
	N (%)
Sex (female)	163 (61.7)
Place of residence	
Beirut	101 (38.3)
Mount Lebanon	97 (36.7)
South Lebanon	23 (8.7)
Bekaa	15 (5.7)
Nabatieh	9 (3.4)
Baalbeck-Hermel	7 (2.7)
North Lebanon	6 (2.3)
Akkar	6 (2.3)
Marital status	
Single	175 (66.4)
Married	30 (11.4)
In a relationship	59 (22.3)
Educational level	
Uneducated	5 (1.9)
School degree	14 (5.3)
Bachelor's degree	98 (37.1)
Master's degree	90 (34.1)
Doctorate/professional doctorate degree	57 (21.6)
Monthly income (L.L)	
Unemployed	75 (28.4)
< 1,500,000	35 (13.3)
1,500,000–3,000,000	60 (22.7)
3,000,000–4,500,000	28 (10.6)
4,500,000–10,000,000	34 (12.9)
> 10,000,000	32 (12.1)

Table 2 The prevalence of alexithymia, somatic symptom burden, brief resilience coping abilities, TMD risk, and oral behavior among the sample population as per the TAS-20, SSS-7, BRCS, TMD-pain screener, and OBC-21

	N (%)	Mean (SD)
Alexithymia		50.13 (10.06)
Non-alexithymic	89 (33.7)	
Possible alexithymic	82 (31.1)	
Alexithymic	93 (35.2)	
Somatic Symptom Scale		10.98 (6.54)
No-to-minimal risk	29 (11.0)	
Low risk	68 (25.8)	
Medium risk	53 (20.1)	
High risk	48 (18.2)	
Very high risk	66 (25.0)	
Brief resilience coping		13.41 (3.35)
Low	129 (48.9)	
Medium	84 (31.8)	
High	51 (19.3)	
TMD risk		1.26 (1.59)
No risk	231 (87.5)	
High risk	33 (12.5)	
OBC risk grade		13.41 (3.35)
No risk	5 (1.9)	
Low risk	165 (62.7)	
High risk	93 (35.4)	

BRCS Brief Resilient Coping Scale, *OBC* Oral Behavior Checklist, *SSS* Somatic Symptom Scale, *TAS* Toronto Alexithymia Scale, *TMD* Temporomandibular disorder

Table 3 The Pearson correlation coefficients between alexithymia, OBC, and TMD-risk scores

Total score		Alexithymia	OBC	TMD
Alexithymia	*r*	1	0.067	0.188*
	p-value		0.278	0.002
OBC	*r*	0.067	1	0.524***
	p-value	0.278		< 0.001
TMD	*r*	0.188*	0.524***	1
	p-value	0.002	< 0.001	

r Pearson correlation coefficient, *OBC* Oral Behavior Checklist, *TMD* Temporomandibular disorder

*Weak positive correlation, ***Strong positive correlation

an income lower than 10,000,000 L.L were associated with increased alexithymia scores as compared with the unemployed. Therefore, an increase in the income was negative predictor of alexithymia score.

Table 5 suggests that increased categories of somatic symptom burden have increasing likelihood of high-risk oral behaviors grade. For instance, those with moderate somatic symptom burden (moderate SSS category) were 5.5 times more likely to suffer from high-risk OBC grade than those with minimal somatic symptom burden; the odds ratio increased with high and very high levels of somatic symptom burden. Only high risk of oral behaviors was predictive of TMD risk. Others did not appear to directly associate with TMD-risk category. Nevertheless, when analyzed on the continuous score, alexithymia was a significant positive predictor of TMD risk (model 2 of Table 6). Also, female sex was significantly associated with increased TMD-risk score than the male sex.

Discussion

To the best of our knowledge, this is the first study in Lebanon that aimed to assess the possible relationship between alexithymia, oral behaviors, and TMD.

Table 4 Predictors of alexithymia

Predictor	Estimate (B)	SE	*t*	95% confidence interval		*p*
				Lower	Upper	
Model 1						
Intercept[a]	55.58	3.72	14.94	48.25	62.91	< 0.001
Age	−0.09	0.13	−0.71	−0.35	0.16	0.477
SSS category: no to minimal[a]						
SSS: low	0.90	2.10	0.43	−3.24	5.04	0.669
SSS: medium	5.46	2.20	2.48	1.12	9.79	0.014
SSS: high	5.61	2.28	2.46	1.12	10.11	0.015
SSS: very high	9.85	2.17	4.54	5.57	14.13	< 0.001
BRCS category: low[a]						
BRCS: medium	−3.83	1.32	−2.89	−6.44	−1.22	0.004
TMD category: no risk[a]						
TMD risk	0.38	1.90	0.20	−3.36	4.13	0.841
OBC grades: low risk[a]						
OBC: high risk	0.37	1.33	0.28	−2.26	3.01	0.780
Gender						
Female[a]						
Male	−3.93	5.15	−0.76	−14.07	6.22	0.446
Age × gender: interaction						
Age × gender	0.140	0.19	0.72	−0.24	0.52	0.470
Model 2						
Constant	51.81	3.09	16.74	45.71	57.89	0
SSS score	0.58	0.09	6.59	0.40	0.75	< 0.001
Age	0.08	0.10	0.75	−0.12	0.27	0.455
Female gender	−0.86	1.19	−0.73	−3.19	1.47	0.468
Income = unemployed[a]						
Income ≤ 1,500,000 L.L	−1.97	1.93	−1.02	−5.76	1.83	0.309
Income = 1,500,000–3,000,000 L.L	−4.25	1.65	−2.57	−7.49	−0.99	0.011
Income = 3,000,000–4,500,000 L.L	−5.23	2.08	−2.51	−9.33	−1.13	0.013
Income = 4,500,000–10,000,000 L.L	−6.16	1.95	−3.16	−9.99	−2.32	0.002
Income ≥ 10,000,000 L.L	−1.40	2.00	−0.70	−5.34	2.54	0.485

Model 1, $R^2 = 0.19$; model 2, $R^2 = 0.198$

BRCS Brief resilient coping scale, *OBC* Oral Behavior Checklist, *SSS* Somatic symptom scale

[a] Represents reference level

Prevalence of symptoms

Our study showed that the prevalence of alexithymia among our general population is 35.2%. Our result was high compared to other countries such as Germany and Japan and a Lebanese study on alexithymia done in 2019 [32–34]. The higher alexithymia levels compared to those studies could be explained by differences in the age groups of the participants and general stressors during the recruitment timeframe. Although the age of our sample population ranged between 18 and 63 years, the majority were in their 20s which could lead to higher alexithymia scores. Also, since 2019, Lebanon has been crippled by a triad of the COVID-19 pandemic, the Beirut explosion, and a dreadful economic crisis [35]. Such ongoing conflicts and instabilities could have contributed to the higher prevalence observed [36–38]. The prevalence of TMD risk in our population was 33%. This finding is consistent with a recent systematic review and meta-analysis reporting the prevalence of TMD among the generation population for adults/elderly to be approximately 31% [39]. It is noteworthy to mention that the lack of underestimation or overestimation of the presence of TMD in our sample may be attributed to the use of the TMD-Pain Screener Questionnaire, which has been shown to investigate the presence of both painful and non-painful TMD. Further, the prevalence of oral

Table 5 Binary logistic regression model for OBC category

Predictor	Estimate (B)	SE	OR	95% confidence interval		*p*
				Lower	Upper	
Constant	−1.75	0.87	0.17			0.043
Age	−0.02	0.02	0.98	0.93	1.02	0.343
Female gender	0.27	0.28	1.31	0.75	2.29	0.337
SSS category: no to minimal[a]						< 0.001
SSS: low	0.83	0.68	2.28	0.60	8.68	0.226
SSS: medium	1.70	0.67	5.49	1.47	20.53	0.011
SSS: high	2.15	0.68	8.59	2.28	32.36	0.001
SSS: very high	2.05	0.66	7.75	2.13	28.27	0.002

Nagelkerke's pseudo-$R^2 = 13.3\%$, *HL* $p = 0.338$

OBC Oral behavior checklist, *SSS* somatic symptom scale

[a] Represents reference level. OBC category— low risk: reference

Table 6 Results of multivariable linear regression for TMD-risk score and logistic regression for TMD-risk category

Model 1 (Predictors of TMD-risk score)						
Predictor	**Estimate (B)**	**SE**	**OR**	**95% confidence interval**		***p***
				Lower	**Upper**	
Intercept	−19.21	1148.99	4.55E-09	0	Inf	0.987
Age	0.03	0.03	1.026	0.96	1.09	0.436
Gender: Female[a]						
Male	−0.37	0.46	0.693	0.28	1.71	0.425
Alexithymia category: no alexithymia[a]						
Possible alexithymia	0.01	0.60	1.014	0.31	3.3	0.981
Alexithymia	0.31	0.55	1.362	0.46	4	0.575
SSS category: no to minimal[a]						
SSS: low	14.39	1148.99	1.79E + 06	0	Inf	0.990
SSS: medium	15.47	1148.99	5.26E + 06	0	Inf	0.989
SSS: high	16.18	1148.99	1.06E + 07	0	Inf	0.989
SSS: very high	16.04	1148.99	9.25E + 06	0	Inf	0.989
BRCS category: low[a]						
BRCS: medium	−0.43	0.56	0.65	0.24	1.79	0.409
BRCS: high	−0.64	0.59	0.53	0.16	1.71	0.285
OBC grades: low risk[a]						
OBC: high risk	2.17	0.49	8.77	3.31	23.19	< 0.001
Model 2 (Predictors of TMD-risk category)						
Predictor	**Estimate (B)**	**SE**	***t***	**95% confidence interval**		***P***
				Lower	**Upper**	
Intercept	−2.09	0.61	−3.41	−3.29	−0.88	< 0.001
Age	0.01	0.01	0.85	−0.02	0.04	0.396
Gender						
Male[a]						
Female	0.37	0.17	2.19	0.04	0.71	0.03
Total alexithymia score	0.02	0.01	2.88	0.01	0.04	0.004
Total OBC score	0.07	0.01	9.65	0.06	0.08	< 0.001

Model 1, Nagelkerke pseudo-$R^2 = 26.8\%$, *HL* $p = 0.860$; model 2, $R^2 = 0.35$

BRCS Brief resilient coping scale, *OBC* Oral Behavior Checklist, *SSS* Somatic symptom scale

[a] Represents reference level; dependent variable reference: no-risk category

behaviors was not low (35.2%). Although studies on the prevalence of oral behaviors or parafunctions in the general population are lacking, the prevalence in the current report corroborated that of prior studies on oral behaviors that ranged between 21 and 27% in specific populations [40–42].

Association of physical and psychological symptoms

With the growing substantial body of research throughout the years, the definition of TMD has undergone a paradigm shift from an isolated localized orofacial pain to a complex condition best viewed within a biopsychosocial model of illness. In this investigation, alexithymia seemed to be a positive predictor of TMD risk. The role of alexithymia in the etiology of TMD remains unclear. The effect of alexithymia in TMD patients may result in an intricate and multifactorial biological response that can cause modifications in the neuroendocrine function along with psychosocial and physical adjustments [9]. Literature data demonstrate that individuals with alexithymia have increased neural response in the limbic and paralimbic systems to stimuli within a physical context [43]. In line with these results, Younger et al. and his colleagues found that patients with TMD exhibit an increase in gray matter volume in limbic regions that may reflect deficits in central emotional processing [44]. One can postulate that alexithymia reduces the individual's ability to describe and label emotions which causes misperceptions and response bias of undifferentiated physiological facets of emotions and, therefore, may account for higher levels of dysfunction and pain [45, 46]. As such, alexithymia may be a risk factor for the subsequent pain or dysfunction in patients with TMD. In fact, multiple clinical trials have demonstrated that selecting behavioral therapies based on the psychosocial profile of patients with TMD is effective [47, 48]. Thus, the management of TMD could be optimized by adding tailored behavioral therapies based on the predominant psychosocial traits of the patients in conjunction with the usual treatment.

There has been controversy about whether oral behaviors are considered a possible cause of TMD. It could be attributed to the lack of consensus regarding the definition of oral behaviors. In our study, participants with high-risk oral behaviors were found to have an increased likelihood of TMD risk. This comes in concordance with recent studies that supported the latter association [49, 50]. The major proposed mechanisms by which oral behaviors serve as an etiological role in the development of TMD involve exerting increased muscular tension in the masticatory system or excessive load affecting the temporomandibular joints [10].

In agreement with previous reports, our study showed that higher TMD-risk score was found to be gender related and more frequent in females [51–54]. The explanation behind the differences between genders has not been clearly established; however, hormonal, cultural, and psychosocial factors certainly play a vital role [55, 56]. In addition, disparities in stress levels, sensitivity to pain, and treatment-seeking behaviors seem to corroborate the gender variance [53]. Indeed, women appear to be more vulnerable to stress and display a greater pain sensitivity in comparison to men [57, 58].

In this study, high-risk oral behavior grade correlated with increased somatic symptom burden levels. This highlights the complex interrelationship between oral behaviors and the psychological state of the patient. The majority of the previous studies on oral behaviors focused primarily on its association with depression [4, 59–61] rather than somatic symptom burden. For instance, S. J. Park et al. showed that oral health behaviors and depression are associated to some extent in women mainly [60]. Similarly, a birth cohort in Northern Finland indicated that less favorable oral health behaviors were more present in participants with a higher number of depression symptoms [4]. Thus, further investigation on the interaction of somatic symptom burden in oral behaviors is warranted. Identifying factors that contribute to the initiation, maintenance, or even exacerbation of oral behaviors can help enhance the therapeutic alliance with patients.

In this present study, alexithymia was associated with higher levels of somatic symptoms. Patients with alexithymia are characterized by having difficulties identifying and communicating one's emotions. As such, in the circumstances with underlying psychological stress, they are more likely to focus on physical rather than affective sensations of emotions. Therefore, such patients tend to express and manifest psychosocial stress through an alternate psychological dimension [62]. In a similar context, multiple studies revealed a close association between alexithymia and somatic burden [63, 64]. The latter demonstrated that patients with alexithymia exhibit somatosensory amplification. Consequently, they tend to perceive normal and visceral sensations as unusually intense, noxious, and disturbing, along with hypervigilance to bodily sensations [63, 64]. Moreover, alexithymia has also been linked to maladaptive coping mechanisms and behaviors that include overreporting of physical symptoms and overusing medical resources [64, 65]. This is in line with our hypothesis that people with higher coping skills are less likely to be affected by alexithymia.

Regarding sociodemographic characteristics and their relation to alexithymia, participants with a lower income showed a higher alexithymia score. This highlights that the financial state has a major effect on the

emotional state of participants. Several studies have pointed out similar results associating low socioeconomic status with alexithymia [66, 67]. It is hypothesized that poor socio-relational skills and interaction in people with alexithymia may lead to lesser success in an individual's social and professional life.

This study has a number of limitations. The use of a cross-sectional design did not allow us to establish causal relationships between psychological disturbances and physical symptoms. However, the findings of our study highlighted the need for additional longitudinal studies to evaluate a causal association. The study may also be subjected to recall and outcome biases as it used self-reported questionnaires that might have led to underreporting or amplifying symptom severity.

Conclusion

Notably, alexithymia, oral behaviors, and TMD are prevalent among the Lebanese adult population. Our study found that while alexithymia was linked to a higher risk of TMD, the association with somatic symptom burden was only evident in relation to oral behaviors. The established relationship between TMD and oral behaviors, as well as emotional traits, highlights the importance of healthcare providers assessing the psychological status of patients with TMD before choosing a treatment plan. By considering the dominant psychosocial comorbidities of patients with TMD when selecting therapy, the risk of treatment failure or relapse may be reduced.

Abbreviations

BRCS	Brief Resilient Coping Scale
DDF	Difficulty describing feelings
DIF	Difficulty identifying feelings
EOT	Externally oriented thinking
OBC-21	Oral Behavior Checklist-21
SSS-8	Somatic Symptom Scale-8
TAS-20	Toronto Alexithymia Scale-20
TMDs	Temporomandibular disorders
TMJ	Temporomandibular joint

Acknowledgements

Not applicable.

Authors' contributions

NI made substantial contributions to the study conception and design. NI and AE completed data collection and analysis and wrote the first draft of the manuscript. All authors contributed to intellectual and critical review of the manuscript drafts. All authors read and approved the final manuscript.

Funding

No funding was obtained from any public or private sector.

Availability of data and materials

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

Declarations

Ethics approval and consent to participate

All procedures were revised and approved by the Ethical Committee of the Neuroscience Research Center.

Consent for publication

Electronic informed consent was obtained from all participants.

Competing interests

The authors declare that they have no competing interests.

Received: 30 September 2023 Accepted: 14 November 2023
Published online: 26 December 2023

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