

Correlation Between Anxiety, Depression, and Self-Perceived Hoarseness: A Systematic Review of the Literature

*Abdul-Latif Hamdan, *Christophe Abi Zeid Daou, *Zeina Maria Semaan, *Lana Ghzayel, *Randa Al Barazi, and †*Jerome R. Lechien, *Beirut, Lebanon, †Mons, Belgium, and ‡Paris, France

SUMMARY: Objective. This review aims to evaluate the correlation between anxiety, depression, and self-perceived hoarseness in patients with dysphonia.

Study design. Systematic review.

Methods. A systematic search of Medline, PubMed, and Cochrane databases was performed. Studies focusing on the relationship between anxiety, depression, and self-reported voice measures in dysphonic patients were included, while duplicates, incomplete data, animal studies, and reviews were excluded, following Preferred Reporting Items for Systematic Reviews and Meta Analyses guidelines.

Results. Of the 416 articles identified, 24 papers were reviewed. Eleven studies met the inclusion criteria and were included. Most studies used the Voice Handicap Index (VHI), VHI-10, and the Hospital Anxiety and Depression Scale as assessment tools. The studies demonstrated a positive correlation of varying degrees between anxiety, depression, and self-perceived hoarseness, except for patients with spasmodic dysphonia in one study.

Conclusion. This review highlights significant positive correlation between anxiety, depression, and self-perceived hoarseness, emphasizing the importance of early identification and treatment of mental health issues to improve patient outcomes.

Key Words: Dysphonia—Anxiety—Depression—Voice Handicap Index (VHI-10)—Systematic review.

INTRODUCTION

Depression and anxiety are some of the most common mental disorders; according to the World Health Organization, 4.4% and 3.6% of the world's population are affected by anxiety and depression, respectively.¹ There is a predilection for females, with a female-to-male ratio of 3:2 being noted for depression, and 2:1 for anxiety. Both anxiety and depression often coexist with multiple systemic diseases, but what remains unclear is whether they are the cause or result of these diseases.^{2,3} Notably, mental disorders affect the degree of self-perceived illness. For instance, in patients with gastrointestinal disorders, anxiety and depression have been shown to lower the threshold for perceiving visceral stimuli, like dyspepsia and irritable bowel syndrome.⁴ In a study involving 225 participants, Kessing et al reported a positive correlation between high anxiety levels and the severity of perceived reflux episodes, specifically retrosternal pain ($P < 0.05$) and retrosternal burning ($P < 0.05$).⁴ Huang et al examined the correlation between anxiety and depression and refractory laryngopharyngeal reflux disease (LPRD) in 28 patients and noted that anxiety and

depression affected the occurrence, progression, and treatment efficacy of refractory LPRD. The effectiveness of treatment for LPRD improved when psychological factors were considered in the treatment plan.⁵ Similar results have been reported in patients with disorders of the lower airway. Martínez-Gestoso et al investigated the impact of anxiety and depression on the prognosis of patients with chronic obstructive pulmonary disease and found that depression led to an exacerbation of the disease, decreased physical activity, and a decline in quality of life.⁶ Their findings were corroborated by others who also noted an increased risk of mortality in affected subjects.⁷ The adverse effect of mental disorders on self-perceived illness has also been documented in patients with autoimmune diseases. In 2016, Matcham et al investigated 56 patients with rheumatoid arthritis and found a strong link between depression and anxiety and the subjective components of the Disease Activity Score with a 28-joint count at 12-month follow-up. The authors concluded that early identification and treatment of these mental disorders could improve the overall treatment outcome.⁸ Alok et al investigated a cohort of patients with fibromyalgia and found a strong association between the severity of depression, anxiety, and stress and the increased severity of all three of the Fibromyalgia Impact Questionnaire—Revised components—pain, symptoms, and functional impairment—compared with 60 healthy controls.⁹

Considering all the above, it is not surprising that anxiety and depression may impact self-perceived hoarseness in patients with voice disorders, although self-perceived hoarseness can also be the cause of anxiety and depression. Several studies on the relationship between anxiety and/or depression and self-perceived hoarseness have been published in the literature with diverse results.^{10–19} The disparities were mostly ascribed to the differences in the demographic characteristics

Accepted for publication June 5, 2025.

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

From the *Department of Otolaryngology-Head and Neck Surgery, American University of Beirut Medical Center, Beirut, Lebanon; †Department of Surgery, University of Mons, Mons, Belgium; and the ‡Department of Otolaryngology-Head and Neck Surgery, Foch Hospital, School of Medicine, University Paris Saclay, Paris, France.

Address correspondence and reprint requests to Abdul-Latif Hamdan, Department of Otolaryngology - Head and Neck Surgery, American University of Beirut Medical Center, 11-0236, Riad El Solh, 1107 2020 Beirut, Lebanon. E-mail: ah77@aub.edu.lb

Journal of Voice, Vol xx, No xx, pp. xxx–xxx
0892-1997

© 2025 The Voice Foundation. Published by Elsevier Inc. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

<https://doi.org/10.1016/j.jvoice.2025.06.007>

of the study groups, and self-assessment outcome measures used. The purpose of this paper is to present a systematic review of the literature on the correlation between anxiety, depression, and patient self-perceived hoarseness.

MATERIALS AND METHODS

Search strategy

The study protocol was registered in The International Prospective Register of Systematic Reviews (CRD420251056709). In this systematic review, Medline through OVID (1946 to May 2025), PubMed, and Cochrane databases were systematically searched. There were no restrictions regarding language or date of publication, but the full text had to be available. We included studies reporting on the correlation of anxiety and depression with self-reported voice measures in patients with dysphonia and hoarseness. We excluded duplicate studies, and those with incomplete or unavailable data, animal experiments, narrative reviews, and systematic reviews.

Search terms included hoarseness, voice disorders, dysphonia, depression, anxiety, psychology, and mental disorders. The review was performed following the relevant items in the Preferred Reporting Items for Systematic Reviews and Meta Analyses statement ([Appendix A](#)).

Literature screening

The literature selection was done by two independent reviewers and based on participant, intervention, comparators, and outcomes (PICO) strategy that aimed at answering the following question: is there a correlation between anxiety/depression and self-reported voice measures in patients with dysphonia?

We included any studies that looked at self-reported voice measures such as Voice Handicap Index (VHI), VHI-10, and voice symptoms score (VoiSS). We included studies that evaluated anxiety and depression using validated scales such as Brief Symptom Inventory (BSI), Beck Depression Inventory-Fast Screen (BDI-FS), Beck Anxiety Inventory (BAI), Hamilton Depression Rating Scale (HAM-D), and Hamilton Anxiety Rating Scale (HARS).

Risk of bias (RoB)

RoB was assessed by two independent reviewers using Cochrane's risk of bias in non-randomized studies - of interventions tool for observational studies. Risk of bias in non-randomized studies - of interventions is a domain-based tool that considers confounding, selection of participants, classification of interventions, deviation from intended interventions, missing data, measurement of outcomes, and selection of reported results as domains for RoB. The studies were classified according to an overall assessment by outcome as low, moderate, serious, or critical ([Appendix B](#)).

RESULTS

The search strategy yielded 416 articles. After removal of duplicates and filtering the articles by title, 24 articles

remained for assessment. When filtering the articles by intervention and outcomes, 11 studies satisfied the inclusion criteria ([Table 1](#)).

Voice outcome measures

Most studies used the VHI as an assessment tool for dysphonia. Five studies used the full version of the VHI,^{10-12,16,17} while five used the shorter version,^{13,14,18-20} namely the VHI-10. One study used the VoiSS questionnaire.¹⁷

Assessment of anxiety and depression

The tools used to assess anxiety and depression were varied. Four studies used the Hospital Anxiety and Depression Scale (HADS).^{12,13,15,17} Other tools that were used included BSI, BDI-FS, BAI, HAM-D, HARS, General Anxiety Disorder-7 (GAD-7), and Patient Health Questionnaire-9 (PHQ-9).

Review of the literature

The relationship between anxiety, depression, and voice disorders has been explored by various authors. The current studies in the literature ($n = 10$) can be stratified based on the outcome measures used or on the etiology of voice disorder. Based on the outcome measures used, these can be divided into three categories: the VHI,^{10-12,16,17} the VHI-10,^{13,14,18-20} versus the VoiSS ($n = 1$).¹⁵ Five studies have used the VHI questionnaire. Mirza et al noted a negative correlation between the severity of dysphonia and psychiatric symptoms in patients with spasmodic dysphonia (SD), and a positive correlation in those with functional dysphonia (FD). The authors used the BSI as a screening tool for anxiety and depression in a cohort of 42 patients.¹⁰ Elam et al reported a mild but positive correlation between the BDI-FS score and that of the VHI emotional domain in patients with reflux and hoarseness.¹¹ Siupsinskiene et al also reported a weak but positive correlation between the severity of anxiety and depression and the VHI score ($r = 0.23$ and $r = 0.17$, respectively) in a cohort of 525 participants, 437 of whom with voice disorders.¹² Along the same line, Taito et al noted a significant correlation between the VHI score and the HADS-Anxiety score in patients with vocal dysfunction following thyroidectomy,¹⁷ and Andrea et al reported a positive correlation between HAM-D/HARS and VHI scores in 83 patients with psychogenic and muscle tension dysphonia (MTD).¹⁶ Five studies used the VHI-10. Hu et al reported a positive correlation between the VHI-10 score and that of the HADS in 139 patients with SD13, and Misono et al reported a weak positive correlation between the BSI-18 and the VHI-10 ($r = 0.13$) in a study on 533 dysphonic patients.¹⁴ Cobanoglu showed a positive correlation between the VHI-10 score and the BSI score before and after voice therapy in 23 patients with nodules.¹⁸ Gartling found a significant positive correlation between the GAD-7 score and VHI-10 score in MTD ($r = 0.26$, $P < 0.01$) and vocal fold paralysis (VFP) patients ($r = 0.38$, $P < 0.01$), as well

TABLE 1.
Results of the Studies Included in the Systematic Review Looking at the Correlation Between Self-Perceived Hoarseness and Anxiety and/or Depression

Author, Year	Number of Patients	Disease Entity and Number of Patients	Screening Tool for Anxiety/Depression	Self-Perceived Voice Outcome Measured	Results
Mirza, 2003 ¹⁰	42	FD (n = 17), SD (n = 14), and VFP (n = 11)	BSI	VHI	Correlation between severity of dysphonia and psychiatric symptoms was negative for SD ($r = -0.42$ to -0.57), positive for FD and VFP ($r = 0.45-0.54$). Positive correlation between BDI-FS score and VHI emotional domain score ($r = 0.3$, $P = 0.008$) for all. No correlation was found between BDI-FS scores and VHI physical or functional domain scores.
Elam, 2010 ¹¹	89	LPR (n = 36) and control (n = 53)	BDI-FS	VHI	Positive correlation between HADS-A/HADS-D and VHI ($r = 0.23$, $P = 0.001$) ($r = 0.17$, $P = 0.008$). No other significant correlations were found.
Siupsinskiene, 2011 ¹²	525	Benign voice disorders (n = 437), control (n = 88)	HADS	VHI	Positive correlations ($P < 0.05$) between VHI-10 and CAPE-V overall ($r = 0.25$, $P = 0.002$), HADS-A ($r = 0.27$, $P = 0.002$), and HADS-D ($r = 0.18$, $P = 0.04$). Individuals who reported greater vocal handicap reported higher levels of psychological distress ($r = 0.13$, $P = 0.003$) and higher levels of perceived stress ($r = 0.16$, $P < 0.0001$).
Hu, 2016 ¹³	139	Adductor SD (n = 139)	HADS	VHI-10	Strong correlation between emotional VoiSS and HADS-A (Rho = 0.68, $P < 0.001$) and HADS-D (Rho = 0.62, $P < 0.001$). The impairment and physical VoiSS score were less strongly correlated with HADS anxiety (0.55 and 0.41, $P < 0.001$) or depression (0.48 and 0.23, $P = 0.02$).
Misono, 2016 ¹⁴	533	Dysphonia (MTD, benign laryngeal lesion...)	BSI-18	VHI-10	Positive correlation between HAM-D and all scores of VHI in the psychogenic group (VHI-T $r = 0.424$, $P = 0.007$; VHI-F $r = 0.369$, $P = 0.021$; VHI-P $r = 0.35$, $P = 0.029$; VHI-E $r = 0.414$, $P = 0.009$). And between HARS and all scores of VHI in the psychogenic group (VHI-T $r = 0.491$, $P = 0.002$; VHI-F $r = 0.443$, $P = 0.005$; VHI-P $r = 0.362$, $P = 0.024$; VHI-E $r = 0.517$, $P < 0.001$).
Montgomery, 2016 ¹⁵	177	FD (n = 96), organic laryngeal lesions (n = 81)	HADS	VoiSS	No significant correlations were identified between psychological variables and VHI scores in the MTVD1 and MTVD2 groups.
Andrea, 2018 ¹⁶	83	Psychogenic (n = 39), primary MTD (n = 16), and secondary MTD (n = 28)	HAM-D HARS	VHI	Postoperative VHI was significantly associated with HADS-A score ($r = 0.448$, $P = 0.010$). Postoperative VHI was not significantly associated with HADS-D score ($r = 0.225$, $P = 0.215$).
Taito, 2022 ¹⁷	32	Post thyroidectomy (n = 32)	HADS	VHI	

TABLE 1 (Continued)

Author, Year	Number of Patients	Disease Entity and Number of Patients	Screening Tool for Anxiety/Depression	Self-Perceived Voice Outcome Measured	Results
Cobanoglu, 2023 ¹⁸	23	Nodules (n = 23)	BSI BAI	VHI-10	Positive correlation between VHI-10 and BSI scores only both before and after voice therapy ($r = 0.441$ with $P = 0.035$ and $r = 0.458$ with $P = 0.024$). No significant correlation was observed between VHI-10 scores and BAI scores neither before nor after therapy.
Gartling, 2024 ¹⁹	335	MTD (n = 116), atrophy (n = 54), VFP (n = 91), and laryngeal lesions (n = 74)	GAD-7 PHQ-9	VHI-10	Significant correlation between the GAD-7 and VHI-10 in MTD ($r = 0.26$, $P < 0.01$), VFP ($r = 0.38$, $P < 0.01$). No significant correlation was observed between VHI-10 and GAD-7 in patients with atrophy or lesions ($P = 0.07$ and $P = 0.72$, respectively). Significant correlation between PHQ-9 and VHI-10 for MTD ($r = 0.26$, $P < 0.01$), VFP ($r = 0.35$, $P < 0.01$), and lesions ($r = 0.31$, $P < 0.01$). No significant correlation was observed in patients with atrophy ($P = 0.06$).
Hamdan, 2024 ²⁰	100	Structural (n = 79), FD (n = 15), and neurological (n = 6)	GAD-7 PHQ-9	VHI-10	Patients with moderate or severe anxiety had a significantly higher VHI-10 score than those with minimal anxiety ($P < 0.05$). There was a mild positive correlation between the level of anxiety and the VHI-10 score ($r = 0.276$). Patients with moderate or mild depression had a significantly higher VHI-10 score than those with mild depression ($P < 0.05$). There was a mild positive correlation between the level of depression and the VHI-10 score ($r = 0.316$).

Abbreviations: CAPE-V, consensus auditory-perceptual evaluation of voice; HADS-A/HADS-D, hospital anxiety and depression scale-anxiety and depression scale-depression; VHI-E, emotional subscale of VHI; VHI-F, functional subscale of VHI; VHI-P, physical subscale of VHI; VHI-T, total score of VHI; VoIS, voice symptoms score.

as between the PHQ-9 score and the VHI-10 score for patients with MTD ($r = 0.26$, $P < 0.01$), VFP ($r = 0.35$, $P < 0.01$), and vocal fold lesions ($r = 0.31$, $P = 0.03$).¹⁹ Hamdan et al reported a mild positive correlation between VHI-10 score, level of anxiety using GAD-7, and level of depression using PHQ-9 ($r = 0.276$ and $r = 0.316$, respectively).²⁰ Only one study used the VoiSS. Montgomery et al examined the diagnostic performance of the emotional domain of the VoiSS questionnaire about anxiety and depression in a cohort of 177 patients and found a strong correlation between the emotional VoiSS score and the HADS score for anxiety and the HADS for depression. The authors concluded that the emotional VoiSS score can be used as a measure of psychological illness.¹⁵

Given the disparity in voice diagnosis across these reports, the correlation between anxiety, depression, and self-perceived hoarseness has also been examined in relation to the etiology of dysphonia. With respect to patients with MTD, Andrea et al found no correlation between VHI scores and HAM-D or HARS scores, whereas Gartling et al reported a significant correlation between VHI-10 and both GAD and PHQ-9 scores. Given the variation in assessment tools between these studies, no generalized conclusion could be drawn. In patients with benign vocal fold lesions, Montgomery et al found a strong correlation between VoiSS scores and HADS scores, particularly within the emotional domain. Similarly, Siupsinskiene et al reported a statistically significant difference ($P < 0.05$) in HADS-A scores between patient and control groups in cases of Reinke's edema, nodules, and papillomatosis. Cobanoğlu et al included patients with nodules in their study group and found a positive correlation between VHI-10 scores and BSI both before and after therapy ($r = 0.441$, $P = 0.035$; $r = 0.458$, $P = 0.024$). Similar results were observed in studies on VFP, where dysphonia severity scores (VHI and VHI-10) were positively correlated with psychological symptom scores. Mirza et al reported a positive correlation between VHI and BSI scores.¹⁰ Siupsinskiene et al found similar associations between VHI and both HADS-A and HADS-D,¹² and Gartling et al demonstrated a positive correlation between VHI-10 and both GAD and PHQ-9 scores.¹⁹ Similarly, in 2024, Hamdan et al found a mild positive correlation between VHI-10 scores and both GAD-7 and PHQ-9 scores, with significantly higher VHI-10 scores observed in patients with more severe anxiety or depression.²⁰ With respect to laryngopharyngeal reflux (LPR), both Elam et al and Siupsinskiene et al investigated patients with LPR and found that VHI scores were positively correlated with psychological symptom score, specifically, HADS¹² and BDI-FS.¹¹ The only voice diagnosis with conflicting results on the correlation between self-perceived hoarseness, anxiety, and depression, was SD. Two studies focused specifically on this population: Mirza et al found a negative correlation between dysphonia severity (VHI) and psychological symptoms (BSI) in 14 patients with SD, whereas Hu et al, in a larger cohort of 139 patients with adductor SD, reported a positive correlation between VHI-10 and both HADS and consensus auditory-perceptual evaluation of voice scores.

DISCUSSION

Overall, the literature indicates that there is a positive correlation between self-perceived hoarseness and severity of anxiety and depression in patients with vocal disorders, except for those with SD in one study.¹⁰ The degree of correlation varied across studies depending on the type of voice disorder and outcome measure used. The most common self-assessment tools used were the VHI and VHI-10, and the most used screening questionnaire for anxiety and depression was the HADS. The correlation between these mental disorders and self-perceived hoarseness has been highlighted in patients with FD by Mirza et al and Montgomery et al, in patients with structural dysphonia by Siupsinskiene et al, Montgomery et al, Misono et al, and Gartling et al, and in patients with vocal fold movement disorders by Mirza et al, Hu et al, and Gartling et al.^{10,12–15,19} The correlation between anxiety and depression and self-perceived hoarseness has also been demonstrated in patients with other causes of dysphonia such as LPR.¹¹ The lack of consensus on the link between anxiety, depression, and SD, and the report of a negative correlation between self-perceived hoarseness can be ascribed to the fact that patients with a long-standing diagnosis may have greater coping mechanisms and reduced levels of psychological distress. In 2018, Hu et al investigated the prevalence of psychological disorders in SD patients. Their results showed lower percentages of anxiety and depression (13.4% and 2.8%, respectively) in comparison to previous studies. The authors attributed this low prevalence to the mean duration of the disease in their cohort.²¹

Although the results of this review suggest a correlation between anxiety, depression, and voice disorders, the limitations of self-reported measures used by the authors, namely the VHI and VHI-10 in the majority of the studies, except one, ought to be considered. Given the diverse aspects of voice disorders, further investigations using other multidimensional questionnaires such as the Vocal Tract Discomfort Scale (VTDS)²² are needed to unveil the relationship between mental disorders and voice. The VTDS, for instance, measures the perception of discomfort in terms of frequency and amplitude using eight descriptors related to the vocal tract. Symptoms such as throat itching or tightness fall within the spectrum of voice disorder's symptomatology, especially in professional voice users, and yet these are missing in the VHI questionnaire.

The authors of this paper suggest several mechanisms for the correlation between anxiety, depression, and self-perceived hoarseness. It is important to note that these remain hypothetical, given the lack of data supporting these suggested mechanisms in the studies reviewed in this paper. One is the adverse effect of anxiety and depression on salivation. Stress, anxiety, and depression are considered by many as psychological risk factors for xerostomia and for the decrease in unstimulated salivary flow. In a study on 247 subjects, Gholami et al reported a significant correlation between anxiety, depression, and unstimulated flow rate. The Depression Anxiety Stress Scale was used to screen for these mental disorders, and 5-minute salivary samples were collected to measure salivary flow.²³ Similarly, Vatchala Rani et al examined the relationship

between mental disorders and salivary flow and noted a significantly higher prevalence of stress, anxiety, and depression in patients with reduced salivary flow rate and in those with xerostomia.²⁴ As hydration is of paramount importance in phonation, a decrease in salivary flow may exacerbate self-perceived hoarseness. Indeed, local and systemic dehydration are known to cause an increase in the phonatory threshold pressure, that is, the minimal pressure needed to set the vocal folds into vibration.²⁵ That said, a decrease in salivary flow in patients with anxiety and depression may exacerbate vocal tiring and the need to put more effort into talking, all of which increases self-perceived hoarseness.

A second mechanism to explain the correlation between anxiety, depression, and self-perceived hoarseness is the negative effect of anxiety and depression on breathing. Several studies have shown an association between psychological distress and respiratory symptoms²⁶ with anxiety symptoms being a main driver to respiratory symptoms even in the absence of lung disease. This association is likely bidirectional and may be due to common risk factors such as genetics, smoking, and environmental influences.²⁶ One suggested mechanism is the intensification of the subjective symptom of breathlessness. High anxiety sensitivity has been associated with an increase in lower respiratory symptoms. Leander et al investigated the impact of anxiety and depression on respiratory symptoms in a cohort of 2270 subjects; 11% of whom had anxiety, 2.5% had depression, and 4% had both. The authors found that all respiratory symptoms were statistically more common in those with depression and anxiety in comparison to those without.²⁷ Tiller et al compared the sensation of breathlessness in eight patients with anxiety disorders in comparison to eight normal control subjects using the resistive load test. The authors found that anxious patients were less sensitive to the added loads, although the effort in overcoming each load was normal.²⁸ Anxiety and depression have also been shown to induce smoking, which is a main risk factor for dysphonia. Anxiety and depression have been associated with a greater risk of smoking relapse, thus reducing the success of smoking cessation. This has been ascribed to the fear of arousal of anxiety symptoms.²⁹ The adverse effect of anxiety on breathing has also been well-described during a panic attack. In patients with panic attacks, anxiety can lead to hyperventilation, shortness of breath, dyspnea, and panic attacks,³⁰ all of which may adversely impact self-perceived voice symptoms given the paramount role of breathing in phonation.

Another suggested mechanism is the low self-esteem in patients with anxiety and depression. Self-esteem or image is a person's subjective assessment of their value and worth.³¹ The link between self-esteem and mental health is complex. There is strong evidence of a mutual relationship between depressive mood states and low self-esteem.³² In 2023, in a systematic review exploring the relationship between low self-esteem and depression and/or anxiety disorders, Lee et al noted that perceived negative interpersonal events were linked to lower self-

esteem. Individuals with high levels of shame and low self-compassion tended to have lower self-esteem.³³ Low self-esteem and poor image of one's self may adversely impact phonation and are often associated with hypophonia, loss of volume, and inability to project the voice. Although the impact of low self-esteem on the speaking voice may not be self-perceived or poorly rated perceptually, its effect on the professional voice during a challenging performance warrants serious consideration. Self-perceived hoarseness is not confined to alteration in voice pitch and timber, but includes disturbance in volume and voice tiring. When these symptoms are present, the work-up of self-perceived hoarseness should encompass the mental state and well-being of the patient. A disturbance in volume and hypophonia may lead to a compensatory laryngeal behavior and FD.

The major limitations of the studies present in the literature include the retrospective nature of most studies, the lack of a control group, and the small sample sizes in some. Future controlled trials should be geared toward looking at the correlation between anxiety, depression, and self-perceived hoarseness using both subjective and objective measures.

CONCLUSION

Despite the differences in the self-assessment tools for hoarseness and the questionnaires used for screening mental disorders, there is ample evidence in the literature to support the presence of a correlation between depression and anxiety self-perceived hoarseness in various voice disorders. More research is needed to understand the disparity in the correlation between anxiety, depression, and various voice disorders.

Ethical statement

The American University of Beirut Institutional Review Board has determined that this is not a "Human Subject Research" and hence no ethical approval is required.

Data availability statement

The data that support the findings of this study are available upon request. Abdul-Latif Hamdan confirms that he has full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Declaration of Competing Interest

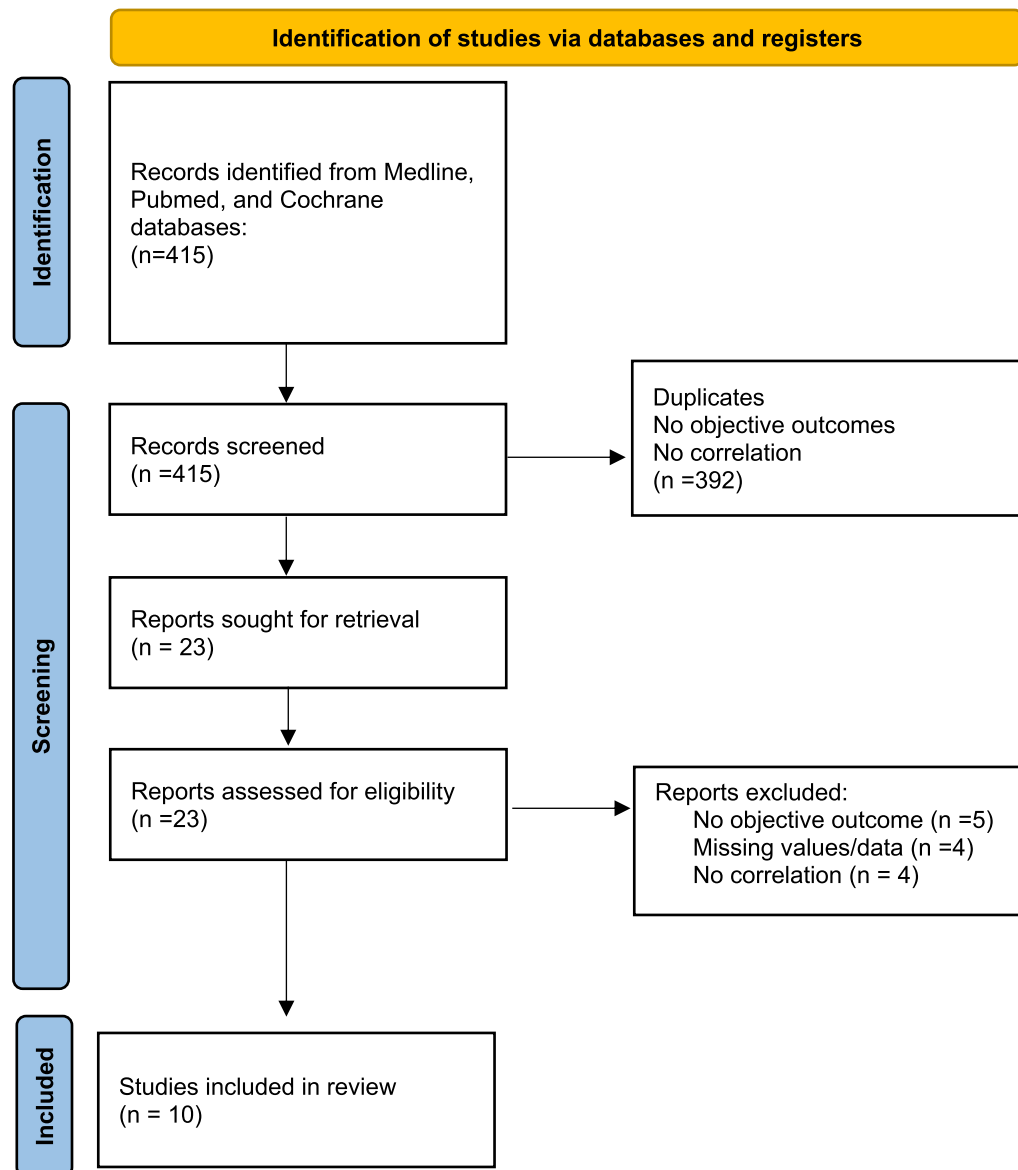
The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

None.

Appendix A

PRISMA 2020 flow diagram for new systematic reviews that included searches of databases and registers only



From: Page et al.³⁴

Appendix B

Characteristics of the Studies Included in the Meta-analysis

Study	Confounding	Selection	Classification of Intervention	Deviation From Intervention	Missing Data	Outcome Measure	Reporting
Mirza et al	MR	LR	LR	LR	LR	MR	MR
Elam et al	MR	MR	LR	LR	LR	LR	LR
Siupsinskiene et al	MR	LR	LR	LR	LR	LR	LR
Hu et al	LR	MR	LR	LR	LR	MR	LR
Misono et al	MR	MR	LR	LR	LR	LR	LR
Montgomery et al	MR	MR	LR	LR	LR	LR	MR
Andrea et al	MR	MR	LR	LR	LR	LR	LR
Taito et al	MR	MR	LR	LR	LR	MR	LR
Cobanoglu et al	MR	MR	LR	LR	LR	MR	LR
Gartling et al	MR	MR	LR	LR	LR	MR	MR

Abbreviations: LR, low risk; MR, moderate risk.

References

- Depression WH. *Other Common Mental Disorders: Global Health Estimates*. Geneva: World Health Organization; 2017.
- Bobo WV, Grossardt BR, Virani S, et al. Association of depression and anxiety with the accumulation of chronic conditions. *JAMA Netw Open*. 2022;5:e229817.
- DeJean D, Giacomini M, Vanstone M, et al. Patient experiences of depression and anxiety with chronic disease: a systematic review and qualitative meta-synthesis. *Ont Health Technol Assess Ser*. 2013;13:1–33.
- Kessing BF, Bredenoord AJ, Saleh CM, et al. Effects of anxiety and depression in patients with gastroesophageal reflux disease. *Clin Gastroenterol Hepatol*. 2015;13:1089–1095.e1.
- Huang F, Liao Q, Gan X, et al. Correlation between refractory laryngopharyngeal reflux disease and symptoms of anxiety and depression. *Neuropsychiatr Dis Treat*. 2022;18:925–932.
- Martínez-Gestoso S, García-Sanz MT, Carreira JM, et al. Correction to: Impact of anxiety and depression on the prognosis of copd exacerbations. *BMC Pulm Med*. 2022;22:213.
- Vikjord SAA, Brumpton BM, Mai XM, et al. The association of anxiety and depression with mortality in a COPD cohort. The HUNT study, Norway. *Respir Med*. 2020;171:106089.
- Matcham F, Ali S, Irving K, et al. Are depression and anxiety associated with disease activity in rheumatoid arthritis? A prospective study. *BMC Musculoskelet Disord*. 2016;17:155.
- Alok R, Das SK, Agarwal GG, et al. Relationship of severity of depression, anxiety and stress with severity of fibromyalgia. *Clin Exp Rheumatol*. 2011;29:S70–S72.
- Mirza N, Ruiz C, Baum ED, et al. The prevalence of major psychiatric pathologies in patients with voice disorders. *Ear Nose Throat J*. 2003;82:808–810.812, 814.
- Elam JC, Ishman SL, Dunbar KB, et al. The relationship between depressive symptoms and Voice Handicap Index scores in laryngopharyngeal reflux. *Laryngoscope*. 2010;120:1900–1903.
- Siupsinskiene N, Razbadauskas A, Dubosas L. Psychological distress in patients with benign voice disorders. *Folia Phoniatr Logop*. 2011;63:281–288.
- Hu A, Hillel A, Meyer T. Factors associated with patient-perceived hoarseness in spasmodic dysphonia patients. *J Voice*. 2016;30:769.e23–769.e26.
- Misono S, Meredith L, Peterson CB, et al. New perspective on psychosocial distress in patients with dysphonia: the moderating role of perceived control. *J Voice*. 2016;30:172–176.
- Montgomery J, Hendry J, Wilson JA, et al. Pragmatic detection of anxiety and depression in a prospective cohort of voice outpatient clinic attenders. *Clin Otolaryngol*. 2016;41:2–7.
- Andrea M, Andrea M, Figueira ML. Self-perception of quality of life in patients with functional voice disorders: the effects of psychological and vocal acoustic variables. *Eur Arch Otorhinolaryngol*. 2018;275:2745–2754.
- Taito M, Hamamoto T, Chikui N, et al. Association between subjective voice assessment and psychological distress after thyroidectomy. *J Perianesth Nurs*. 2022;37:260–263.
- Çobanoglu HB, Oğut MF, Sirin S, et al. The evaluation of Beck Anxiety Scale, Voice Handicap Index, and Brief Symptom Inventory on treatment of patients with vocal fold nodules. *J Voice*. 2023;37:470.e1–470.e6.
- Gartling GJ, van Mersbergen M, Crow K, et al. The patient experience: the relationship between vocal handicap, congruency, perceived present control, and mood across four voice disorders. *J Voice*. 2024;38:244.e15–244.e27.
- Hamdan AL, Ghzayel L, Yamine Y, et al. Correlation between anxiety, depression, and self-perceived hoarseness: a case series of 100 Lebanese patients. *J Voice*. 2024;S0892-1997(24)00349-7.
- Hu A, Hillel A, Zhao W, et al. Anxiety and depression in spasmodic dysphonia patients. *World J Otorhinolaryngol Head Neck Surg*. 2018;4:110–116.
- Lopes LW, de Oliveira Florencio V, Silva POC, et al. Vocal Tract Discomfort Scale (VTDS) and Voice Symptom Scale (VoiSS) in the evaluation of patients with voice disorders. *J Voice*. 2019;33:381.e23–381.e32.
- Gholami N, Hosseini Sabzvari B, Razzaghi A, et al. Effect of stress, anxiety and depression on unstimulated salivary flow rate and xerostomia. *J Dent Res Dent Clin Dent Prospects*. 2017;11:247–252.
- Vatchala Rani RM, Kumar D, Dheer SS, et al. Stress depression and anxiety with xerostomia among young Indian adults. *Bioinformation*. 2023;19:1365–1370.
- Hamdan AL, Sibai A, Rameh C. Effect of fasting on voice in women. *J Voice*. 2007;21:495–501.
- Ho CSH, Tan ELY, Ho RCM, et al. Relationship of anxiety and depression with respiratory symptoms: comparison between depressed and non-depressed smokers in Singapore. *Int J Environ Res Public Health*. 2019;16:163.
- Leander M, Lampa E, Rask-Andersen A, et al. Impact of anxiety and depression on respiratory symptoms. *Respir Med*. 2014;108:1594–1600.

28. Tiller J, Pain M, Biddle N. Anxiety disorder and perception of inspiratory resistive loads. *Chest*. 1987;91:547–551.
29. Fluharty M, Taylor AE, Grabski M, et al. The association of cigarette smoking with depression and anxiety: a systematic review. *Nicotine Tob Res*. 2016;19:3–13.
30. Leyro TM, Zvolensky MJ, Vujanovic AA, et al. Anxiety sensitivity and smoking motives and outcome expectancies among adult daily smokers: replication and extension. *Nicotine Tob Res*. 2008;10:985–994.
31. Donnellan MB, Trzesniewski KH, Robins RW. Self-esteem: enduring issues and controversies. In: Chamorro-Premuzic T, von Stumm S, Furnham A, eds. *The Wiley-Blackwell Handbook of Individual Differences*. Wiley Blackwell; 2011:718–746.
32. Fennell M. *Overcoming Low Self-esteem: A Self-help Guide Using Cognitive Behavioural Techniques*. Hachette UK; 2016.
33. Lee JY, Patel M, Scior K. Self-esteem and its relationship with depression and anxiety in adults with intellectual disabilities: a systematic literature review. *J Intellect Disabil Res*. 2023;67:499–518.
34. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. <https://doi.org/10.1136/bmj.n71>.