Social anxiety, voice confrontation and voice recognition: A bilingual exploration

Jigar Jogia[1,2] , **Justin Thomas[3], Mariapaola Barbato[2]** , **and Richard Bentall[4]**

[1]School of Psychology, University of Birmingham, Dubai, United Arab Emirates
[2]Department of Psychology, Zayed University, Dubai, United Arab Emirates
[3]King Abdulaziz Center for World Culture (Ithra), Dhahran, Saudi Arabia
[4]School of Psychology, University of Sheffield, Sheffield, UK

*M*any people dislike the sound of their voices, especially when listening back to audio recordings (voice confrontation). Previous research reports that disliking the sound of one's voice is associated with elevated levels of social anxiety. The present study investigated the relationship between social anxiety and voice dislike and voice misrecognition among a bilingual population: Arabic (L1) and English (L2). Participants ($N = 176$) completed self-report measures of social anxiety and own voice liking. Additionally, they performed a novel own voice recognition task, assessing their ability to recognise a recording of their voice, differentiating it from digitally altered versions of the same recording. Social anxiety symptomatology was associated with disliking the sound of one's voice, with a larger effect for L1 than L2. Social anxiety was also associated with own voice misrecognition, but only for L1. Highly negative evaluations about the sound of one's voice may represent a vulnerability for social anxiety disorder.

Keywords: Social anxiety; SAD; Social phobia; Voice; Bilingual.

Social anxiety disorder (SAD) is a common and debilitating anxiety disorder (American Psychiatric Association, 2013) that also represents a unique risk factor for substance use disorders (Stein & Stein, 2008). Community-based lifetime prevalence estimates for SAD vary widely. According to the latest epidemiological data, approximately SAD 30-day, 12-month, and lifetime prevalence estimates are 1.3, 2.4 and 4.0% across all countries (Stein et al., 2017). The disorder is characterised by persistent and intense fear/anxiety in social or performance situations; contexts where an individual might be exposed to the scrutiny and negative evaluations of others (American Psychiatric Association, 2013). The range of feared situations can be broad (generalised), where severe anxiety is evoked by almost any public performance situation or social interaction. Conversely, fears can be highly situation-specific, for example, conversing with unfamiliar people or giving a speech (American Psychiatric Association, 2013). While it is not uncommon for healthy individuals to experience some degree of anxiety in social situations—especially public speaking—the level of anxiety experienced in SAD is excessive, manifesting as panic attacks in more severe and complex presentations of the condition (Potter et al., 2014). Consequently, feared situations are systematically avoided, or endured with extreme distress, resulting in clinically significant levels of social and occupational dysfunction.

Cognitive distortions are patterns of thinking that lead individuals to perceive reality inaccurately impacting emotional expression (Mercan et al., 2023). The cognitive distortion hypothesis posits that certain patterns of irrational thinking contribute to the aetiology and prognosis of mental health conditions, such as depression and anxiety (Guglielmo, 2015). Even subclinical levels of social anxiety, however, can be associated with a high degree of cognitive distortion and emotional distress. Past research finds that, among non-clinical populations, social anxiety symptoms are associated with

lower self-worth and heightened levels of self-criticism (Cox et al., 2004; Stein & Stein, 2008). In line with such observations, and taking a continuum perspective, cognitive theories of SAD suggest that socially anxious individuals hold negative and distorted self-images (Clark & Wells, 1995). They also tend to give harsher and more negative evaluations of their performances in social situations, relative to the ratings of independent observers (Rapee & Hayman, 1996). Furthermore, there is emerging evidence that such distorted, overly negative, self-appraisals may also extend to evaluations about the qualities of one's voice (Lundh et al., 2002).

In one of the few studies to explore voice evaluations in SAD, researchers had a small number of undergraduate students listen back to a tape recording of their own voices (Lundh et al., 2002). The students were tasked with rating the sound of their recorded voice for positive and negative characteristics using a voice evaluation questionnaire. In addition to self-ratings, the participants' voice recordings were also rated by independent observers (speech therapy students). The results supported a cognitive distortion hypothesis, where elevated levels of social anxiety were related to underestimating self-voice qualities, compared with the ratings of the independent observers. In other words, students with heightened levels of social anxiety also tended to be hypercritical of their own voices. Subsequent research has identified alterations in neural information processing in brain regions related to self-reference among individuals diagnosed with SAD compared with healthy individuals (Liao et al., 2010). These altered neural networks may suggest an underlying mechanism for negative self-appraisal, including disliking one's own voice. Lundh et al. (2002) suggest that regular feedback, via a structured form of listening to own voice recordings, might prove useful as a method for correcting the negative perception and or evaluation of one's own voice.

This phenomenon of own voice dislike appears to be common. One study of own-voice evaluation suggests that 31% of participants felt negatively about their voices, with 24% feeling neutral, and less than half (44%) experiencing their own voice positively (Chong et al., 2022). Furthermore, when exposed to recordings of their voices, many people also suggest that the voice in the recording sounds alien, somehow not them (Shuster & Durrant, 2003). This perception of "not quite me" is well explained by basic auditory research. For instance, when listening to a recorded voice, the sound is conducted through the air, undistorted by bone and tissue. However, when talking live, people hear their voices through both air and bone/tissue conduction of approximately equal intensity (Tonndorf, 1970). It is proposed that this latter configuration—air, bone and tissue—maximises the carrying power of utterances while minimising the loudness with which individuals hear themselves (Békésy, 1949). Consequently, recorded

voices—air only—never sound as deep or as full as the live voice (Shuster & Durrant, 2003). Despite the auditory discrepancy between live and pre-recorded voices, individuals are still generally adept at recognising their own pre-recorded vocalisations. However, there is a fair degree of variability. These individual differences in recognising one's own voice may also be related to overly negative perceptions and evaluations of one's voice.

Research on social anxiety and own voice perception has rarely used bilingual samples. In bilingual speakers, the Foreign Language effect (FLE) also needs to be addressed. FLE refers to a phenomenon where emotional reactivity differs between a person's native language and a foreign language. Native languages are typically acquired in emotionally rich contexts, such as family interactions, cultural practices, and personal experiences. In contrast, foreign languages are often learned in emotionally neutral academic environments. Consequently, bilinguals may exhibit distinct emotional responses when processing emotions in their native language versus a foreign language. For instance, bilingual participants have been presented with moral dilemmas in either their native language or a foreign language. The reduced emotional response elicited by the foreign language seemed to reduce the impact of intuitive emotional concerns, leading to more utilitarian choices (in favour of societal benefit) (Costa et al., 2014). FLE manifests not only in cognitive decisions but also in physiological responses, bilinguals have been shown to exhibit more pronounced galvanic skin responses to emotionally laden linguistic stimuli presented in their native language compared to a foreign language (Jankowiak & Korpal, 2018). Emotional processing in bilinguals is complex and there is a need to better understand how emotions intersect with language, focusing on the intricate interplay between mind, language and affect (Brouwer, 2019).

The current study aims to further explore the relationship between voice dislike and social anxiety in bilingual individuals (Arabic L1 and English L2). Additionally, this is the first study we are aware of that explores the association between social anxiety and voice recognition accuracy. In line with the cognitive distortion model, we proposed that negative evaluations about the sound of one's voice represent a vulnerability for SAD. We hypothesised (H1) that own voice liking (OVL) would be negatively correlated with social anxiety measured using the fear subscale of the Liebowitz Social Anxiety Scale (LSAS) for L1 more than L2. Similarly grounded in the cognitive distortion model, we explored the idea that social anxiety might be linked with poorer performance on a task designed to assess own voice recognition (OVR) accuracy. This study investigates these ideas among bilingual participants, assessing both the mother tongue (L1 = Arabic) and the second language (L2 = English). This is an important distinction, as previous research has demonstrated lower levels of

emotional reactivity among bilinguals when using L2. For example, research among bilingual (Turkish/English) speakers found that uttering obscenity in L2, evoked significantly less autonomic reactivity than it did in L1 (Harris et al., 2003). This affective attenuation associated with second language use has also been observed among Emiratis (Thomas et al., 2019). This emotional attenuation associated with the second language may also extend to the relationship between voice dislike and social anxiety. We hypothesised (H2) that performance on a voice recognition task would be negatively correlated with social anxiety measured using the fear subscale of the LSAS for L1 more than L2.

METHOD

Participants

Participants were a convenience sample of Emirati college women ($N = 176$), attending Zayed University, a federal university in the United Arab Emirates (UAE). All participants were citizens of the UAE, studying a wide variety of majors. They were all native Arabic speakers with a high level of English language competency. The language of instruction at the participating institution is English, and admission requires that students are bilingual in Arabic and English. All participants who were majors attending the university were required to have an IELTS score of 6 for admission into any major. All participants were proficient in English to IELTS level 6 although some, those who attended English-speaking primary and secondary schools would have near native proficiency. For some students context of L2 learning would be through private English curriculum primary and secondary/high school education. At the time of the study, the institution was gender-separated and it was only feasible to recruit female students. The mean age of participants was 20.69 years ($SD = 2.32$). All participants gave written informed consent, and the study was approved by Zayed University's Research Ethics Committee (1949F).

Measures

The Liebowitz Social Anxiety Scale

The LSAS (Liebowitz, 1987) is an English language 24-item measure used to assess the situational severity and level of impairment caused by social anxiety. Although the LSAS was originally designed as a clinician-administered assessment, it has been adapted and successfully employed as self-report measure (Rytwinski et al., 2009). The self-report LSAS has two subscales, one exploring social interaction (e.g., "Meeting strangers"), while the other assesses public performance situations (e.g., "Using a telephone in public"). The scale

provides scores for levels of fear and for levels of situational avoidance. In the present study, to reduce the testing load, only levels of fear were assessed. The responses are indicated by reporting the level of fear experienced (none $= 0$, mild $= 1$, moderate $= 2$ or severe $= 3$) across a range of potentially anxiety-provoking situations. Previous studies have reported excellent internal reliability for the LSAS along with good convergent validity with other commonly used assessments of social anxiety (Beard et al., 2011). The sensitivity and specificity of the self-report LSAS have also been favourably evaluated, with the scale correctly classifying 93.90% of patients when using a score of 30 as the threshold/cut-off (Beard et al., 2011). The internal reliability for the LSAS in the present study was good $\alpha = .97$. Similarly, the social and performance subscales also demonstrated good internal reliability $\alpha = .96$ and $\alpha = .91$.

Own voice recognition task

The OVR task was developed using a Windows-based rapid application development tool (Microsoft Visual Basic version 10). This novel task allowed participants to make a digital recording of their own voices prior to performing the task. An internal microphone was used on a MacBook pro (96 KHz sampling frequency) to make the recording. The software instructed individuals to record the simple phrase "hello world" when intending to perform that task in English, and its Arabic equivalent, "marhaban bil 'alam," when performing in Arabic.

Once the phrase was recorded the software altered the fundamental frequency of the recorded voice, and then presented six versions of the participant's utterance, including the original unaltered version. The altered and unaltered voices were presented in the form of playback buttons. The five altered voices were randomly increased or decreased by 5, 10 or 15 Hz (Hz), resulting in a matrix of voice recordings that were of higher or lower fundamental frequency than the original. Randomisation was also used to allocate all six versions of the recording to the playback buttons, labelled A through to F. Participants clicked each button in sequence (A to F), with the aim of correctly recognising the true, unaltered, recording of their voice.

Own voice liking

The OVL measure was a single-item self-report scale. The OVL item asked participants to rate how much they likes/dislike their own voice in general. The response anchor was from 1 to 10, where 1 = "I absolutely hate my own voice," and 10 = "I absolutely love my own voice." The OVL item was language-specific depending upon which trial (Arabic or English) the participant was

performing. For example, "When speaking *Arabic*, how much do you like/dislike your own voice in general?"

Procedure

After giving informed consent and being reassured about the anonymity of the study, participants were tested individually on a laptop computer in a quiet psychology laboratory away from extraneous noise and distraction. Participants completed the OVR task before answering the OVL question and an onscreen version of the LSAS. Once participants had completed all tasks in one language, they performed the OVR and answered the OVL question for the other language (English/Arabic). Performance order was counter-balanced with approximately 50% of the participants completing in English, preceded by Arabic and vice versa.

RESULTS

LSAS item analysis

As previously mentioned, the LSAS evaluates both levels of fear and levels of situational avoidance. However, in this current study, to reduce the testing load, only the LSAS fear subscale was examined. The mean total score on the LSAS was 33.68 ($SD = 11.90$), Median 33.5, IQR (18), range $= 63$. Max 65 Min 2, mean scores for the social interaction and the public performance subscales were 15.25 ($SD = 10.25$) and 11.86 ($SD = 7.80$), respectively. The mean score per item was 1.13 ($SD = .73$), the mean item scores for each of the subscales were 1.17 ($SD = .78$) and 1.07 ($SD = .70$), for the social and performance subscales, respectively. Table 1 details the five most fear-eliciting (anxiogenic) LSAS items/situations.

Own voice liking and recognition

Participants were more accurate at recognising their own voices when they worked in Arabic, correctly recognising their own voice 85.6% of the time. When performing the OVR task in English, accuracy dropped to 74.4%. This language difference was significant, χ^2

TABLE 1
The five most feared items/situations on the LSAS, in descending order of severity

Item	M	SD
Giving a talk to an audience	1.88	1.23
Writing while being observed	1.63	1.16
Speaking up at a meeting	1.57	1.14
Working while being observed	1.57	1.16
Talking to people in authority	1.56	1.09

TABLE 2
Means, standard deviations and correlations for the main study variables (Arabic)

	M	SD	LSAS	OVL	OVR
Age	20.69	2.32	.091	.061	.072
LSAS	32.64	12.11	—	−.228*	−.174*
OVL	5.54	2.34		—	.292*
OVR	—	—			—

Note: $N = 176$. LSAS = Liebowitz Social anxiety scale fear subscale; OVL = own voice liking; OVR = own voice recognition. *$p < .05$.

TABLE 3
Correlations for the main study variables (English)

	LSAS	OVL	OVR
Age	.091	−.143	−.002
LSAS	—	−.181*	−.079
OVL		—	.045

Note: $N = 176$. LSAS = Liebowitz Social anxiety scale fear subscale; OVL = own voice liking; OVR = own voice recognition. *$p < .05$.

$(1, N = 98) = 5.1848$, $p = 0.022$. Using a paired samples T-test, OVL in English ($M = 5.40$, $SD = 2.33$) did not differ significantly from OVL in Arabic ($M = 5.54$, $SD = 2.34$) t([175]) $= −1.66$, $p = <.110$. Using Pearson's product moment correlation with a one-tailed hypothesis, OVL was negatively correlated with social anxiety scores for both languages. Means and correlation coefficients are detailed in Table 2 (Arabic) and Table 3 (English).

All task-based measures were performed in English and Arabic for each participant. Table 3, details the Pearson's correlation coefficient between each of the study's continuous variables when the participants performed the tasks in English.

Aligned with the Arabic (L1) findings, OVL was also negatively associated with social anxiety. However, in contrast to the Arabic trail, OVL in English was uncorrelated with OVR.

DISCUSSION

This study examined own voice dislike (OVL) and voice misrecognition (OVR) as potential correlates of social anxiety. In line with the cognitive distortion model (Clark & Wells, 1995), it was proposed that disliking one's voice may reflect a vulnerability or maintaining factor for SAD (Lundh et al., 2002). The use of a bilingual sample allowed this idea to be explored across both L1 (Arabic) and L2 (English) within the same individuals. For Arabic, as hypothesised (H1), there was a significant negative correlation between OVL and social anxiety scores. Similarly, hypothesis two was also supported and voice recognition accuracy was negatively correlated with social anxiety symptomatology. Furthermore, OVL was also associated with greater accuracy (lower

misrecognition rates) on the OVR task, These findings support the idea that social anxiety might be linked to apprehensions about the sound of one's voice being unpleasant, defective or somehow embarrassing (Lundh et al., 2002). Such a negative appraisal of one's voice might, in turn, lead to lower rates of verbalising in social situations. Being less talkative, less exposed to hearing one's own voice due to social anxiety, might also explain the link between social anxiety and higher rates of own voice misrecognition (OVR). Cognitive models of social anxiety suggest that fear of negative evaluation (FNE) is a potential causal/maintaining mechanism in SAD (Clark & McManus, 2002). Speaking is typically done with the intention of receiving attention and suspecting that one may be evaluated negatively based on the sound of one's voice is likely to exacerbate anxiety in social situations. However, FNE may also be related to physical appearance and other aspects of an individual's behaviour such as eating. Biases in various aspects of information processing is one possible explanation for social anxiety. However, research has implicated various alternative causal mechanisms for social anxiety. Genetic factors play a significant role, with key genes including the serotonin transporter, oxytocin receptor, brain-derived neurotrophic factor and catechol-*O*-methyltransferase (Baba et al., 2022). Additionally, personality traits, particularly neuroticism, contribute to social anxiety (Clague & Wong, 2023). Neurobiological explanations involve a wide range of neurotransmitters (such as serotonin, norepinephrine, glutamate and GABA) and neuropeptides (like oxytocin). Abnormal neural activity and connectivity have been observed in social anxiety occurring in brain regions such as the amygdala, medial prefrontal cortex, dorsal raphe, striatum, locus coeruleus, prefrontal cortex, insular cortex and anterior cingulate cortex (Marazziti et al., 2015).

These current findings are correlational and open to alternative interpretations; however, they do lend further support to the cognitive distortion model of social anxiety (Clark & Wells, 1995) and the idea that one's voice can become the subject of such distortions (Lundh et al., 2002).

Support for the cognitive distortion model was also found when the tasks were performed in English—the participants' second language. As anticipated, in L2 the correlation between OVL and social anxiety was weaker. This may be explained in terms of the FLE where bilinguals have been found to show attenuated emotional responses to stimuli presented in a foreign language compared to their native language (Jankowiak & Korpal, 2018). As native languages are learned in emotionally rich contexts, foreign languages are often acquired in emotionally neutral academic settings. In addition to language acquisition, language proficiency, frequency of use and immersion are also highlighted as factors affecting emotional associations with a language

(Caldwell-Harris, 2014). Furthermore, in L2, the negative correlation between social anxiety and OVR failed to reach statistical significance. These relatively weaker effects for L2 are explainable in terms of L1 being the language most closely associated with emotional experience (Williams et al., 2020). This dominant language, or native tongue, effect might also explain the observation of more accurate voice recognition when working in L1.

Not all the situations deemed social anxiety provoking involve talking (e.g., writing while being observed). However, in the present study, the situation most feared by participants was public speaking. Also, in the top five most feared situations "speaking in a meeting" and "talking to people in authority." It is axiomatic that, for many people, a negative appraisal of one's own voice is likely to exacerbate anxiety in such contexts.

This study is the first, that we can identify, exploring social anxiety symptoms among citizens of the UAE, and levels of social anxiety reported were comparable with similar studies undertaken among students in other nations (Beard et al., 2011). However, previous research suggests that socio-cultural norms can impact levels of social anxiety and the extent to which social anxiety is perceived as being problematic. For example, Heinrichs et al. (2006) explored social anxiety across eight nations, also assessing the extent to which socially reticent behaviours were tolerated. In this study, the collectivist nations (Japan, South Korea and Spain) reported higher levels of social anxiety compared to their individualist counterparts (USA, Australia, Canada, Germany and the Netherlands). However, the collectivist block also reported greater acceptance of socially reticent and withdrawn behaviours. This might explain the relatively lower prevalence of SAD previously reported for collectivist nations. Despite slightly lower rates for SAD in some nations, the condition remains greatly distressing and debilitating for those who do experience it. In this regard, research that might inform the prevention and treatment of SAD is of international relevance.

This study potentially has implications for the treatment and prevention of SAD. For instance, assessing voice liking (voice confrontation) might help identify individuals at greater risk of developing SAD. It may also prove beneficial to explore the use of voice coaching or voice exposure for social anxiety in both therapeutic and preventative contexts.

However, the present study has important limitations. Firstly, the reliance on an all-female college sample limits its generalizability. However, gender-dependent effects on emotions and language processing have been found in the literature previously (Naranowicz et al., 2023). Future studies should assess current individual levels of proficiency in L1 and L2 and factor in age of L2 acquisition. More importantly, however, the cross-sectional and correlation study design precludes any inferences being made about the causal or even the temporal nature of the

association between social anxiety and voice dislike. For example, elevated social anxiety may precede voice dislike. It is also possible that the observed relationship is fully mediated by more global negative self-evaluations. Future longitudinal studies will help disentangle the issue of primacy, identifying if the development of voice dislike precedes the onset of elevated social anxiety symptoms. Similarly, experimental studies will identify if voice coaching or voice exposure can lead to clinically significant remediation of social anxiety symptomatology.

COMPLIANCE WITH ETHICAL STANDARDS

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee at Zayed Univeristy (UAE) and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual adult participants included in the study.

REFERENCES

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. American Psychiatric Association.

Baba, A., Kloiber, S., & Zai, G. (2022). Genetics of social anxiety disorder: A systematic review. *Psychiatric Genetics*, *32*(2), 37–66. https://doi.org/10.1097/ypg.0000000000000310

Beard, C., Rodriguez, B. F., Moitra, E., Sibrava, N. J., Bjornsson, A., Weisberg, R. B., & Keller, M. B. (2011). Psychometric properties of the Liebowitz Social Anxiety Scale (LSAS) in a longitudinal study of African Americans with anxiety disorders. *Journal of Anxiety Disorders*, *25*(5), 722–726. https://doi.org/10.1016/j.janxdis.2011.03.009

Békésy, G. V. (1949). The structure of the middle ear and the hearing of one's own voice by bone conduction. *Journal of the Acoustical Society of America*, *21*, 217–232. https://doi.org/10.1121/1.1906501

Brouwer, S. (2019). The auditory foreign-language effect of moral decision making in highly proficient bilinguals. *Journal of Multilingual and Multicultural Development*, *40*(10), 865–878. https://doi.org/10.1080/01434632.2019.1585863

Caldwell-Harris, C. L. (2014). Emotionality differences between a native and foreign language: Theoretical implications. *Frontiers in Psychology*, *5*, 1055. https://doi.org/10.3389/fpsyg.2014.01055

Chong, H. J., Choi, J. H., & Lee, S. S. (2022). Does the perception of own voice affect our behavior? *Journal of Voice*. https://doi.org/10.1016/j.jvoice.2022.02.003

Clague, C. A., & Wong, Q. J. J. (2023). Social anxiety and its maintaining factors: Accounting for the role of neuroticism. *Journal of Psychopathology and Behavioral Assessment*, *45*, 469–479. https://doi.org/10.1007/s10862-023-10030-2

Clark, D. M., & McManus, F. (2002). Information processing in social phobia. *Biological Psychiatry*, *51*, 92–100.

Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. In *Social phobia: Diagnosis, assessment, and treatment* (pp. 69–93). The Guilford Press.

Costa, A., Foucart, A., Hayakawa, S., Aparici, M., Apesteguia, J., Heafner, J., & Keysar, B. (2014). Your morals depend on language. *PLoS One*, *9*(4), e94842. https://doi.org/10.1371/journal.pone.0094842

Cox, B. J., Fleet, C., & Stein, M. B. (2004). Self-criticism and social phobia in the US national comorbidity survey. *Journal of Affective Disorders*, *82*(2), 227–234. https://doi.org/10.1016/j.jad.2003.12.012

Guglielmo, S. S. (2015). Cognitive distortion: Propositions and possible worlds. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *33*, 53–77. https://doi.org/10.1007/s10942-014-0202-7

Harris, C. L., Aycicegi, A., & Gleason, J. B. (2003). Taboo words and reprimands elicit greater autonomic reactivity in a first language than in a second language. *Applied Psycholinguistics*, *24*, 561–579. https://doi.org/10.1017/.S0142716403000286

Heinrichs, N., Rapee, R., Alden, L., Bögels, S., Hofmann, S. G., Oh, K. J., & Sakano, Y. (2006). Cultural differences in perceived social norms and social anxiety. *Behaviour Research and Therapy*, *44*, 1187–1197.

Jankowiak, K., & Korpal, P. (2018). On modality effects in bilingual emotional language processing: Evidence from galvanic skin response. *Journal of Psycholinguistic Research*, *47*(4), 663–677. https://doi.org/10.1007/s10936-017-9552-5

Liao, W., Chen, H., Feng, Y., Mantini, D., Gentili, C., Pan, Z., Ding, J., Duan, X., Qiu, C., Lui, S., Gong, Q., & Zhang, W. (2010). Selective aberrant functional connectivity of resting state networks in social anxiety disorder. *NeuroImage*, *52*(4), 1549–1558. https://doi.org/10.1016/j.neuroimage.2010.05.010

Liebowitz, M. R. (1987). Social phobia. *Modern Problems of Pharmacopsychiatry*, *22*, 141–173. https://doi.org/10.1159/000414022

Lundh, L.-G., Berg, B., Johansson, H., Nilsson, L. K., Sandberg, J., & Segerstedt, A. (2002). Social anxiety is associated with a negatively distorted perception of one's own voice. *Cognitive Behaviour Therapy*, *31*(1), 25–30. https://doi.org/10.1080/16506070252823634

Marazziti, D., Abelli, M., Baroni, S., Carpita, B., Ramacciotti, C. E., & Dell'Osso, L. (2015). Neurobiological correlates of social anxiety disorder: An update. *CNS Spectrums*, *20*(2), 100–111. https://doi.org/10.1017/S109285291400008X

Mercan, N., Bulut, M., & Yüksel, Ç. (2023). Investigation of the relatedness of cognitive distortions with emotional expression, anxiety, and depression. *Current Psychology*, *42*, 2176–2185. https://doi.org/10.1007/s12144-021-02251-z

Naranowicz, M., Jankowiak, K., & Bromberek-Dyzman, K. (2023). Mood and gender effects in emotional word processing in unbalanced bilinguals. *International Journal of Bilingualism*, *27*(1), 39–60. https://doi.org/10.1177/13670069221075646

Potter, C. M., Wong, J., Heimberg, R. G., Blanco, C., Liu, S. M., Wang, S., & Schneier, F. R. (2014). Situational panic attacks in social anxiety disorder. *Journal of Affective Disorders*, *167*, 1–7. https://doi.org/10.1016/j.jad.2014.05.044

Rapee, R. M., & Hayman, K. (1996). The effects of video feedback on the self-evaluation of performance in socially anxious subjects. *Behaviour Research and Therapy*, *34*(4), 315–322. https://doi.org/10.1016/0005-7967(96)00003-4

Rytwinski, N. K., Fresco, D. M., Heimberg, R. G., Coles, M. E., Liebowitz, M. R., Cissell, S., Stein, M. B., & Hofmann, S. G. (2009). Screening for social anxiety disorder with the self-report version of the Liebowitz Social Anxiety Scale. *Depression and Anxiety*, *26*(1), 34–38. https://doi.org/10.1002/da.20503

Shuster, L. I., & Durrant, J. D. (2003). Toward a better understanding of the perception of self-produced speech. *Journal of Communication Disorders*, *36*(1), 1–11. https://doi.org/10.1016/S0021-9924(02)00132-6

Stein, D. J., Lim, C. C. W., Roest, A. M., de Jonge, P., Aguilar-Gaxiola, S., Al-Hamzawi, A., Alonso, J., Benjet, C., Bromet, E. J., Bruffaerts, R., de Girolamo, G., Florescu, S., Gureje, O., Haro, J. M., Harris, M. G., He, Y., Hinkov, H., Horiguchi, I., Hu, C., … WHO World Mental Health Survey Collaborators. (2017). The cross-national epidemiology of social anxiety disorder: Data from the world mental health survey initiative. *BMC Medicine*, *15*(1), 143. https://doi.org/10.1186/s12916-017-0889-2

Stein, M. B., & Stein, D. J. (2008). Social anxiety disorder. *Lancet*, *371*(9618), 1115–1125. https://doi.org/10.1016/s0140-6736(08)60488-2

Thomas, J., Shehhi, A., & Grey, I. (2019). The sacred and the profane: Social media and temporal patterns of religiosity in The United Arab Emirates. *Journal of Contemporary Religion*, *34*(3), 489–508. https://doi.org/10.1080/13537903.2019.1658937

Tonndorf, J. (1970). Chapter six – Cochlear mechanics and hydro-dynamics. In J. V. Tobias (Ed.), *Foundations of modern auditory theory* (pp. 203–254). Academic Press.

Williams, A., Srinivasan, M., Liu, C., Lee, P., & Zhou, Q. (2020). Why do bilinguals code-switch when emotional? Insights from immigrant parent-child interactions. *Emotion*, *20*(5), 830–841. https://doi.org/10.1037/emo0000568