Anxiety and depression among Canadian undergraduates with decreased sound tolerance

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Abstract

Decreased sound tolerance (DST) is an encompassing term for conditions marked by a reduced tolerance to everyday sounds. Misophonia, sensitivity to specific trigger sounds which cue aversive responses, is one DST subtype. Hyperacusis, another DST subtype, occurs when people are irritated by general sounds that are unbothersome to others. Research suggests that those with DST face heightened mental health challenges. Psychometrically validated measures aligned with the recent misophonia consensus definition have not assessed the relationship between DST and mental health. There is also a complete dearth of DST-mental health research in Canadian universities. Here, 2,095 Canadian undergraduate students completed DST and mental health questionnaires. We explored the relationship between anxiety and depression and DST. We found strong, positive, and significant correlations between DST symptoms and mental health difficulties. These findings highlight DST's detrimental effects and the need for future research on strategies for managing and treating DST in post-secondary institutions.

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Humans encounter various auditory stimuli every day. From music on the radio to ticking clocks, sounds are varied and volatile. For some, the nature of auditory stimuli can be distressful, interfering with many facets of their life. Decreased sound tolerance (DST) is a broad term that encompasses various sound sensitivities. For those with DST, auditory stimuli that may be inconsequential to others are bothersome (Scheerer et al., 2022; Williams et al., 2021). Earlier research shows that DST can impair overall life quality, occupational, academic, and social life (Claiborn et al., 2020; Scheerer et al., 2022; Wu et al., 2014). Further, past work has found that DST strongly correlates with increased instances of mental illness and, in some cases, suicidal ideation (Cassiello-Robbins et al., 2021; Jager et al., 2020; Simner & Rinaldi, 2023). The current work investigates how two forms of DST, *misophonia* and *hyperacusis*, are related to mental illness symptomology in a Canadian undergraduate sample. Understanding how DST influences the mental health of university students will more effectively inform DST prevalence, intervention strategies, and post-secondary design from the classroom to the dormitory.

Misophonia

Misophonia is a DST subtype where certain sounds are particularly bothersome (Swedo et al., 2022). These sounds evoke discomfort or distress and typically lead to behavioural, emotional, and/or physiological responses (Swedo et al., 2022). Often called *trigger sounds*, aversive stimuli can range from dogs barking to people chewing, with the latter being a common trigger (Claiborn et al., 2020). Distinct from other DST subtypes where one may suffer from exposure to sounds in general, only specific triggers or classes of triggers cause distress in those with misophonia. Misophonia contributes to a variety of undesirable outcomes like social isolation, concentration difficulties, and mental health difficulties (Swedo et al., 2022). Mental

health difficulties are particularly concerning, as they may be the culmination of various lifestyle challenges that those with misophonia face.

Depression and anxiety are two common outcomes for those with misophonia. Studies commonly examine the prevalence of mental health comorbidities with misophonia. For example, past work using clinician interviews found that the most common cooccurring mental health disorders with misophonia were major depressive disorder (MDD; n = 39; 6.8%) and anxiety disorders (n = 52; 9%; Jager et al., 2020). Other approaches with structured clinical interviews and self-reports show that depressive, anxious, and neurotic symptoms were higher in a sample with misophonia than in the general population (Schröder et al., 2013). This sample (N = 42) had three individuals (7.1%) with cooccurring mood disorders. Another study using a mix of self-report measures and structured interviews found that 33% of a sample with misophonia and a DSM-V disorder had a depressive disorder, while 17% had generalized anxiety disorder (Frank & McKay, 2019). In contrast, when using structured clinical interviews, researchers found no differences between a high and low misophonia group on anxiety or mood disorders (Cassiello-Robbins et al., 2021).

Using only self-reports, in a large sample (N = 575) of people with misophonia symptomology (N = 385), 13% of respondents had depression (n = 40), and anxiety (n = 41) (Rouw & Erfanian, 2018). Self-report measures indicated moderate, positive correlations between scores on the Misophonia Questionnaire (MQ; Wu et al., 2014) and scores on the Beck Depression (II) and Beck Anxiety Inventories (BAI; Beck et al., 1988a; BDI-II; Beck et al., 1996; Cassiello-Robbins et al., 2021). Further, self-report mean differences across groups showed that those with elevated levels of misophonia symptomology had higher levels of depression and anxiety (Cassiello-Robbins et al., 2021). In a large sample of medical students (N

= 371), there were weak, positive correlations between depression scores on the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001) and misophonia scores on the A-Miso-S (Almadani et al., 2024). Finally, using self-reports in a large sample (N = 205), positive correlations were found between misophonia and anxiety (Scheerer et al., 2024).

Personality disorders are also often examined in those with misophonia. For example, obsessive-compulsive personality disorder (OCPD) often cooccurs in those with misophonia (Jager et al., 2020; Rouw & Erfanian, 2018; Schröder et al., 2013). Instances of obsessive-compulsive disorder (OCD) also increase the odds that one has misophonia (Almadani et al., 2024). Finally, those with higher MQ scores are more likely to meet clinician-rated diagnostic criteria for avoidant personality disorder and borderline personality disorder (Cassiello-Robbins et al., 2021). Altogether, these findings show that many severe mental health challenges are associated with an increased incidence of misophonia.

There are several flaws in the current misophonia-mental health literature. Since the literature is still in its relative infancy, there is considerable variability between samples due to the evolving nature of the measures used to quantify misophonia and the vast array of mental health quotients. As shown above, researchers do not approach misophonia assessment through a uniform framework but use various clinician or self-report indices, often producing varied results. Further, the literature consists of many studies with small sample sizes, ranging from 18 to 575 misophonic participants (Rodrigues, 2023). As noted, the methods used to evaluate mental health disorders and misophonia prevalence vary between pure self-reports and only clinician interviews, introducing variability in the data. Finally, much past research examines the frequencies of cooccurring psychiatric disorders with misophonia but does not always investigate

relationships or variation at distinct levels of misophonia symptoms. The current study aims to build upon the existing literature while filling methodological and analytical gaps.

Hyperacusis

Those who suffer from hyperacusis, another type of DST, have a reduced tolerance to sounds that most people, or those with hyperacusis before symptom onset, perceive as innocuous (Adams et al., 2021). Those with hyperacusis are not attuned to specific sounds, as in misophonia; instead, they show discomfort with sounds at levels that others find tolerable. The broad array of problematic sounds can range from distant traffic to nearby electric mixers (Potgieter et al., 2020). Often, those with hyperacusis report irritation, annoyance, distraction, stress, fatigue, pain, and fear, to name only a few emotions (Scheerer et al., 2024). On top of these undesirable emotional states, hyperacusis affects daily functioning, such that those with hyperacusis may withdraw from social situations, experience occupational or academic interference, or wear earplugs to regain a sense of control over noises (Tyler et al., 2014).

Hyperacusis cooccurs with many other conditions, ranging from irritable bowel syndrome to tinnitus (Paulin et al., 2016). Tinnitus and other hearing impairments are common among those with hyperacusis (Paulin et al., 2016; Jüris et al., 2013). Earlier work suggests that mental health disorders cooccur with hyperacusis. For example, using a clinical interview, 56% of a hyperacusis sample (N = 62) met the criteria for a psychiatric disorder, where 8% (n = 5) of the sample had MDD, and 47% (n = 29) had an anxiety disorder (Jüris et al., 2013). Using physician interviews to diagnose hyperacusis, 10.6% (n = 7) of participants (n = 66) had an anxiety disorder, while 22.7% (n = 15) had depression (Paulin et al., 2016). Among those with self-reported hyperacusis (n = 313), 5.1% (n = 16) of the sample had an anxiety disorder, while 17.3% (n = 54) had depression (Paulin et al., 2016).

Using only self-reports in a large (n = 775), five-year study on healthy aging, those with hyperacusis more often scored higher on the 12-item Short Form Mental Component Scale (SF12-MCS; Ware et al., 1996), indicating worse mental health (Smit et al., 2021). Further, anxiety and stress scores, marked by the 21-item Depression and Anxiety and Stress Scale (DASS21; Lovibond & Lovibond, 1996), were higher for those with hyperacusis (Smit et al., 2021). No matter the diagnostic criterion used, depression was a risk factor for hyperacusis on all depression measures (Smit et al., 2021). Decreased mental health, depression, anxiety, stress, and MDD all significantly increased the risks of hindered daily functioning from hyperacusis (Smit et al., 2021). In a German study, using a Structured Tinnitus Interview (STI) for screening and self-reports on the Questionnaire on Hypersensitivity to Sounds (Nelting et al., 2002) for cooccurring psychiatric conditions, 64% (N = 163; n = 65) of those with hyperacusis had depression, while 39% (n = 40) had an anxiety disorder (Goebel & Floetzinger, 2008). An examination of hyperacusis and mental health disorders using only self-reports found positive correlations between hyperacusis and anxiety, depression, and inadequate quality of life in a large sample (N = 205; Scheerer et al., 2024). Finally, using self-reports alone, 36% (n = 52) of a hyperacusis sample (n = 147) had borderline abnormal to abnormal scores on the depression subscale of the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983; Aazh & Moore, 2017). Further, 62% (n = 91) of the sample had borderline abnormal to abnormal scores on the anxiety subscale of the HADS (Aazh & Moore, 2017).

This broad literature review suggests that hyperacusis presents many difficulties in the lives of those who suffer from it. Like misophonia, there is limited work on how hyperacusis informs mental health. Existing work tends to use discrepant measures and assessment methodologies. Psychometric inconsistency challenges the explanatory power of the literature.

When examining the outcomes of those with misophonia and hyperacusis, there are vast similarities in mental health difficulties and impacts on daily life. Past work has suggested that, in the context of mechanism and treatment analyses, researchers should not examine hyperacusis and misophonia together to avoid conflating the two conditions (Swedo et al., 2022). However, since mental health outcomes in the current population are unexplored, we postulate that it is valuable to examine these conditions together. Exploring the relations between mental health and hyperacusis and misophonia allows for relative differences between the association between mental and different subtypes of DST to be considered. If there are robust differences in the strength of the relation between anxiety and depression and the different types of DST, this will have important implications for treatments and accommodations for each condition.

Gaps in the Literature

Despite growing research efforts dedicated to furthering our understanding of misophonia and hyperacusis over recent years, there are gaps in the literature. First, there is a lack of research investigating DST and mental health. A review article identified only fifteen studies where researchers examined the relationship between DST and mental health (Rodrigues, 2023). While this is an encouraging figure in a once-overlooked area, given the inconsistencies in earlier research, more work must examine the prevalence of mental illness in those with misophonia and hyperacusis.

As illustrated above, past work rarely uses the same methods to assess how DST relates to mental health. Since DST subtypes like misophonia and hyperacusis have long been inadequately defined, using consistent methodologies has been challenging. However, experts recently reached a misophonia consensus definition (Swedo et al., 2022). Further, researchers have recently developed psychometrically validated measures to assess misophonia (Rosenthal et

al., 2021; Williams et al., 2022). These measures have not yet analyzed misophonia's relation to mental health. Following these encouraging trends in the literature, we implement these methods to reach a fuller understanding of how DST subtypes influence mental health.

Another gap in the literature concerns age. Past research mainly recruits older adults. Primarily in the hyperacusis-mental health literature, sample age is often not reported or includes older adults (40-59 years; Jüris et al., 2012; Smit et al., 2021). Further, in the misophonia-mental health literature, the age range is more variable, extending from children (11 years old; Rinaldi et al., 2022) to middle-aged individuals (45 years old; Erfanian et al., 2019).

Only a few studies examining misophonia and mental health exist with an undergraduate sample (e.g., Wu et al., 2014), and, to our knowledge, none exist regarding hyperacusis and mental health. The lack of research on undergraduate populations poses the risk of misophonia and hyperacusis going undetected in post-secondary institutions. University and college campuses demand increased research attention because of the consistently present auditory stimuli and their potential to interfere with learning (Klatte et al., 2013) and social outcomes (Wickie et al., 2025; under review). Post-secondary students attend daily lectures where trigger sounds (sniffling, pens tapping) and general noisiness (classroom projector humming, fluorescent lights buzzing) are present. Since these environments are crucial for academic success, those with DST cannot easily avoid them. Cafeterias, dormitory rooms, and student centres all contain the same difficulties, making current post-secondary campuses unwelcoming to those with DST. University students already face heightened mental health challenges (Sharp & Theiler, 2018), and the addition of inhospitable sensory spaces will all but worsen these struggles. Therefore, it is paramount to examine how prevalent DST is in these environments and how DST relates to mental health disorders in an unexamined population, Canadian undergraduate students.

Hypotheses

We hypothesize strong, positive, and significant correlations between misophonia, measured by the Duke Misophonia Questionnaire (DMQ; Rosenthal et al., 2021), and depression, measured by the Beck Depression Inventory (BDI; Beck et al., 1961). We expect these correlations to be analogous when anxiety, measured via the Beck Anxiety Inventory (BAI; Beck et al., 1988a), is the dependent measure. Further, when examining varied levels of misophonia, measured by the Duke-Vanderbilt Misophonia Screening Questionnaire (DVMSQ; Williams et al., 2022), we expect those with clinically significant misophonia to experience greater levels of depression and anxiety compared to those with sub-clinical or non-clinical misophonia. Further, we predict strong, positive, and significant correlations between hyperacusis, measured via the Inventory of Hyperacusis Symptoms (IHS; Greenberg & Carlos, 2018), and depression and anxiety. Finally, we expect a high prevalence of DST in the undergraduate population, and a high prevalence of cooccurring misophonia and hyperacusis.

Transparency and Openness

Preregistration

The current study was not preregistered.

Data, materials, code, and online resources

The Wilfrid Laurier University (WLU) Research Ethics Board did not approve the dissemination of code, materials, de-identified data, or other resources. Therefore, it is not ethically permissible to share these data. Further, there is no supplementary material associated with this research.

Reporting

We report data exclusion methods, and the measures used in this study below. We do not report how we determined our sample size since we established no methodological outline for data collection quotas. We aimed to collect a large and representative sample, larger than previous DST-mental health studies. Participation in the study was self-motivated and remained open to participants over eight months. After this, we deemed our sample adequate since it was already the largest DST-mental health sample. We also do not report manipulations in this study since we use correlational methods and did not experimentally manipulate any independent variables.

Ethical approval

All procedures were conducted per WLU's Research Ethics Board (REB) guidelines (REB approval #8675) and were consistent with the World Medical Association 2008 Declaration of Helsinki.

Method

Participants

An initial sample of 3,096 undergraduate students (M_{age} = 19.6, SD_{age} = 2.7, 697 male, 2,275 female, 47 non-cis-gendered) were recruited at WLU to participate in the current study. However, after removing careless responses aligned with protocols outlined in the *Data Integrity Check* section, the final sample included 2,095 undergraduate students (M_{age} = 21.7, SD_{age} = 2.7). The final sample included 1,615 participants who identified as female, 436 participants who identified as male, and 44 participants who were non-cis-gendered. We framed this study for participant recruitment as a project investigating factors influencing the quality of life of undergraduate students. There was no mention of DST in the recruitment materials. This strategy controlled for any sampling bias wherein participants interested in DST sign up at higher

frequencies than those unfamiliar with DST. Since this study used a sample from an undergraduate population, the only inclusion criteria were that participants were undergraduate students at WLU, were enrolled in a psychology course, and had access to a device to complete an online survey.

Procedure

Over eight months (September 2023-April 2024), eligible participants completed an online survey via Qualtrics. After providing informed consent, participants completed a demographics questionnaire that collected information such as gender, age, ethnicity, and more. Next, we presented a series of questionnaires including the Misophonia Questionnaire (MQ; Wu et al., 2014), DVMSQ (Williams et al., 2022), DMQ (Rosenthal et al., 2021), IHS (Greenberg & Carlos, 2018), BDI (Beck et al., 1961), BAI (Beck et al., 1988a), Adult/Adolescent Sensory Profile (AASP; Brown & Dunn, 2002), Autism Spectrum Quotient (AQ; Baron-Cohen et al., 2001), and the Multidimensional Social Competence Scale (MSCS; Yager & Iarocci, 2013). We report only DVMSQ, DMQ, IHS, BDI, and BAI data here since these measures align best with the proposed research question. Discussion of the additional measures from this project can be found elsewhere (Manning et al., 2025; under review; Wickie et al., 2025; under review). Once these questionnaires were complete, participants were debriefed and received compensation via course credit.

Measures

Duke-Vanderbilt Misophonia Screening Questionnaire (DVMSQ)

The DVMSQ (Williams et al., 2022) was used to assessed misophonia symptomology. This measure is a modification of an earlier, much longer measure used to evaluate misophonia symptoms. The DVMSQ does not rely on theoretical caseness or empirical cut-off scores,

differing from other misophonia measures. Instead, an algorithm determines if an individual shows symptoms of functional impairment (Williams et al., 2022). The DVMSQ focuses on clinical significance and assesses misophonia symptom status in an individual (i.e., non-clinical, sub-clinical, and clinical levels of misophonia).

The DVMSQ begins with a screening item where participants can indicate if certain sounds are bothersome. If participants answer "no" to this item, the questionnaire is complete, and the DVMSQ total score is "0." If answered "yes", participants can list specific sounds in a free-text field. Those who respond affirmatively to the first screening question go on to complete 18 items, measured on 5-point Likert scales from 0 (e.g., "Never") to 4 (e.g., "Very often"). The DVMSQ divides the 18 items into two theoretically distinct groups. The *Symptom Frequency* category has 11 items, while the *Interference* category has seven items. The range of scores on the DVMSQ is 0-68. High DVMSQ scores represent severe misophonia symptoms. For reliability, the omega-total score (ω_T) for the DVMSQ total score has been reported as high as .98 (Williams et al., 2022).

While there is no empirical cut-off score for this measure, DVMSQ scores fall into three categories: non-clinical, sub-clinical, and clinical levels of misophonia. The main distinction between clinical and sub-clinical misophonia is the impairment due to symptoms. One may have sub-clinical levels of misophonia if they have supra-threshold symptoms of misophonia but experience no impairment in their lives, while those with clinical levels experience supra-threshold symptoms and deal with impairment. Due to the three discrete categories, we treated DVSMQ scores as categorical.

Duke Misophonia Questionnaire (DMQ)

The DMQ is an 86-item measure that examines a variety of constructs relating to misophonia symptomology (Rosenthal et al., 2021). This measure assesses specific triggers, trigger frequency, specific coping strategies, impairment due to misophonia, and dysfunctional beliefs about misophonia. Through combining various misophonia constructs, two composite scales, Symptom Severity (SS) and Symptom Coping (SC), are generated. The DMQ positively correlates with various misophonia measures like the MQ (Wu et al., 2014) and the MISO-S (Schröder et al., 2013).

The current study used the full 86-item measure, capturing scores from both the SS and SC composite scales. The SS composite includes *Affective, Physiological, and Cognitive* subscales (e.g., "My heart pounded or raced") and has 23 items. The SC composite combines temporally relevant subscales defined as *Coping Before, Coping During, and Coping After* (e.g., "I produced an alternate sound") and has 21 items. For both scales, items consisted of both "yes" or "no" responses and 5-point Likert scales from 0 (e.g., "Never") to 4 (e.g., "Extremely"). Higher scores on the DMQ SS indicate more severe misophonia symptoms during trigger sound exposure. Higher scores on the DMQ SC indicate more effective coping skills and greater coping strategy use. The SS and SC measures produce two scores used for correlational analyses in the current study. To classify clinically significant levels of misophonia, we used a suggested average cut-off score of 1.8 for the SS only. The researchers suggest using these scores to assess caseness rather than providing a clinical diagnosis.

The reliability of the SS composite scale is excellent ($\rho_{xx} = .93$, Rosenthal et al., 2021). Earlier work suggests that interpreting the SS composite as a whole scale rather than a series of subscales is best since the reliability of specific factors ($\rho_{xx} = .62$, Rosenthal et al., 2021) was lower than the general factor reliability. The reliability of the SC composite ($\rho_{xx} = .93$, Rosenthal

et al., 2021) was excellent. Again, however, the reliability of the specific factors (when viewed as a series of subscales) was lower than the general factor reliability, showing that the SC composite is also best interpreted as a single composite score (Rosenthal et al., 2021).

Inventory of Hyperacusis Symptoms (IHS)

The IHS is a 25-item questionnaire assessing hyperacusis symptoms (Greenberg & Carlos, 2018). The IHS examines a variety of domains such as severity, loudness perception, psychological functioning, fear, social, cognitive, and occupational hindrances, quality of life, and mental health. This questionnaire uses a 4-point Likert scale with scores ranging from 1 ("Not at all") to 4 ("Very much"). Participants report the frequency and intensity of experiences concerning sound sensitivities (e.g., "My increased sound sensitivity can make me feel hopeless"). Higher scores on the IHS indicate higher hyperacusis symptom severity. A recent analysis of IHS cut-off scores shows that, in a clinical population, a cut-off score of 56 or greater produces refined patient classifications (Aazh et al., 2021). The current study uses this suggested score to classify hyperacusis severity. Upon first formation, Greenberg & Carlos (2018) found excellent internal consistency for the IHS ($\alpha = .93$). More recent work has shown even greater internal consistency for the IHS ($\alpha = .96$, Wickie et al., 2025; under review).

Beck Depression Inventory (BDI)

The BDI (Beck et al., 1961) is a classic instrument used by clinicians and researchers to assess symptoms of depression. This measure is supported by earlier literature suggesting strong internal consistency and a single-factor structure (Beck et al., 1988b; Faraci & Tirrito, 2013). The BDI contains 21 items that are all scored on 4-point Likert scales ranging from 0 (e.g., "I do not feel sad") to 3 (e.g., "I am so sad or unhappy that I can't stand it"). Research has established empirical cut-off scores for severity. Raw scores of 10-18 indicate mild depressive symptoms,

19-29 moderate depressive symptoms, and 30-63 severe depressive symptoms (Beck et al., 1961). The current study used these cut-off scores during the data analysis stage. Faraci and Tirrito (2013) found that the BDI has an internal consistency of $\alpha = .83$ in a non-clinical adult sample.

Beck Anxiety Inventory (BAI)

The BAI (Beck et al., 1988a) was used to assess symptoms of anxiety. This measure is widely used and is a shorter tool that draws on pre-existing measures of anxiety (Beck et al., 1988a). The BAI consists of 21 items that all use a 4-point Likert scale with scores ranging from 0 (e.g., “Not at all) to 4 (e.g., “Severely”). Research has established empirical cut-off scores for severity. Raw scores of 0-7 indicate minimal anxiety, 8-15 mild anxiety, 16-25 moderate anxiety, and 26-63 severe anxiety (Beck & Steer, 1993). The current study used these cut-off scores during the data analysis stage. The BAI has an internal consistency of $\alpha = .92$ (Beck et al., 1988a).

Data Integrity Check

In the current study, multiple methods ensured data accuracy. Before participants began completing questionnaires, a “commitment check” was presented. We informed participants that honest, deliberate, and careful responses were paramount to the research. The commitment check stated, “Do you commit to providing thoughtful answers to all the questions in this survey?” Response options were “Yes, I will,” “No, I will not,” or “I can’t promise either way.” We removed participants from further analyses who did not respond with "Yes, I will." Next, we administered four attention check questions throughout the study to promote adequate attention and reading. For example, “Please select ‘Often true’ to confirm you are reading these questions closely.” If participants incorrectly responded to any attention check question, we removed them

from further analyses. Finally, after completing all the measures, we administered a penalty-free "honesty check". The question asked, “Did you answer any of the above questions randomly?” We removed those who answered "yes" to the honesty check from further analyses. Once respondents meeting any of the above criteria were removed (n = 1,001), we retained a final sample of 2,095 participants.

Data Analysis

Before analysis, we reviewed the dataset for careless, invalid, or duplicate responses, including duplicate IP addresses. Survey completion times greater than two standard deviations from the sample mean were flagged. Further, for any participant, if any items on a given measure were left incomplete, all data for the incomplete measure was omitted. Our large sample allowed us to use this liberal exclusion technique to enhance the precision of the data while maintaining a large sample. If a respondent passed these checks, we included their data. We used an alpha level of .05 for statistical significance for all analyses. However, given our large sample size, we also used effect sizes to evaluate the strength of our effects. For epsilon squared, .01-.06 indicated a small effect, .06-.14 indicated a moderate effect, and .14 and greater represented a large effect (Ben-Shachar et al., 2020). For Spearman’s rho, $\rho \geq .4$ was considered a very strong correlation, $\rho = .3$-$.4$ was strong, and $\rho = .2$-$.3$ was moderate (Ben-Shachar et al., 2020). Finally, for Cliff’s Delta, $\delta \geq .47$ was considered a large effect, δ between .33 and .47 was a medium effect, and δ between .15 and .33 was considered a small effect (Meissel & Yao, 2024).

Assumption Checks

First, we examined the normality assumption in the data using Shapiro-Wilk tests. We discovered that all continuous variables were non-normal. Further, we used the Fligner-Killeen

test to assess the assumption of homogeneity of variances. We also violated this assumption. Logarithmic and square root transformations did not change assumption violations.

We then generated descriptive statistics for age and each DST or mental health measure (see Table 1). Next, we conducted Kruskal-Wallis rank sum tests with DVMSQ scores as our independent variable (IV). The IV had three levels (non-clinical, sub-clinical, and clinical). We used BDI and BAI scores as continuous, dependent variables (DVs). We conducted Dunn's post-hoc tests with a Bonferroni correction for significant main effects (Dinno, 2024). For Kruskal-Wallis effect size, we report epsilon squared (ε^2) (Mangiafico, 2025) values with bootstrapped bias-corrected and accelerated (BCa) 95% CIs confidence intervals (CIs) using 5,000 iterations (Canty & Ripley, 2024; Davison & Hinkley, 1997). For Dunn's post-hocs, we report Cliff's delta (δ) effect sizes (Torchiano, 2020). Finally, we used Spearman's rho to assess correlations between variables. We calculated bootstrapped BCa 95% CIs using 5,000 resamples for Spearman's correlations (Canty & Ripley, 2024; Davison & Hinkley, 1997). We examined the relationships between BAI scores, BDI scores, DMQ SS Scores, DMQ SC Scores, and IHS Scores. All statistical analyses were conducted in *R* (R Core Team, 2025).

Results

The current study benefitted from a large, diverse sample of undergraduate students. Properties of the sample, like clinical significance, mean scores on various measures, and variability are in Table 1.

TABLE 1 HERE

Descriptive Statistics

DVMSQ Severity and Mental Health

The results of a Kruskal-Wallis rank sum test revealed significant differences between participants scoring at distinct levels of the DVMSQ on the BDI, $\chi^2(3) = 187.41$, $p < .001$ (see Figure 1). With such a large sample, it is crucial to examine effect size statistics rather than only traditional hypothesis testing. For the DVMSQ-BDI test, the effect size was moderate, $\varepsilon^2 = .09$, bootstrapped 95% CI [.07, .11]. Dunn's post-hoc analyses revealed that those with clinically significant misophonia scored significantly higher on the BDI than those with non-clinical misophonia, $z = 12.74$, $p < .001$, with a large effect size, $\delta = .61$, 95% CI [.53, .67]. Further, those with clinically significant misophonia had significantly higher BDI scores than those with sub-clinical misophonia, $z = 5.40$, $p < .001$, and a medium effect size, $\delta = .41$, 95% CI [.28, .53]. Finally, those with sub-clinical levels of misophonia had significantly higher BDI scores compared to those with non-clinical misophonia, $z = -4.03$, $p < .001$, and a small effect size, $\delta = .24$, 95% CI [.13, .34].

We found significantly different scores on the BAI when participants scored differently on the DVMSQ, $\chi^2(3) = 221.39$, $p < .001$, with a moderate effect size, $\varepsilon^2 = .11$, bootstrapped 95% CI [.08, .13] (see Figure 1). Games-Howell post-hoc tests show that those with clinically significant misophonia score significantly higher on the BAI than those with non-clinical misophonia, $z = 12.9$, $p < .001$, with a large effect size, $\delta = .63$, 95% CI [.56, .69]. Further, those with clinically significant misophonia had significantly higher BAI scores than those with sub-clinical misophonia, $z = 4.07$, $p < .001$, and a small effect size was found, $\delta = .32$, 95% CI [.18, .45]. Lastly, those with sub-clinical misophonia had significantly greater BAI scores than those with non-clinical misophonia, $z = -5.83$, $p < .001$, with a medium effect size, $\delta = .35$, 95% CI [.24, .45]. The results from both Kruskal-Wallis rank sum tests reveal that participants with

higher misophonia scores show higher mental illness symptomology, marked by increased scores on depression and anxiety measures.

FIGURE 1 HERE

DVMSQ Severity and Mental Health

Correlational Analyses

Next, we conducted correlational analyses using Spearman's rho. First, we examined if the measures assessing depression and anxiety were correlated. We found a positive, very strong, and significant correlation between BDI and BAI scores, $\rho(1754) = .57$, bootstrapped 95% CI [.54, .61], $p < .001$. Our mental health measurements were aligned with the literature since depression and anxiety commonly cooccur and are theoretically similar. To further support the notion that, although theoretically distinct (Swedo et al., 2022), misophonia and hyperacusis symptomology showed related outcomes, we examined the relation between the instruments used to assess these constructs. First, scores on the DMQ SS were positively, very strongly, and significantly correlated with IHS scores, $\rho(1618) = .82$, bootstrapped 95% CI [.80, .84], $p < .001$. Further, we examined the DMQ SC and IHS relationship, revealing a very strong, positive, and significant correlation, $\rho(1618) = .78$, bootstrapped 95% CI [.76, .80], $p < .001$. These findings support the inclusion of hyperacusis in the current study since the outcomes that those with misophonia and hyperacusis experience are similar and the scores on their respective measures are alike.

Misophonia and Mental Health Correlations

To evaluate our primary hypothesis, we examined the correlation between misophonia symptomology and mental health disorders. First, we found a very strong, positive, and significant correlation between BAI scores and DMQ SS scores, $\rho(1521) = .59$, bootstrapped

95% CI [.55, .62], $p < .001$, suggesting that anxiety symptomology worsens as participants report higher SS scores on the DMQ. Still focusing on the DMQ, we found a very strong, positive, and significant correlation between BAI scores and DMQ SC scores, $\rho(1521) = .48$, bootstrapped 95% CI [.44, .52], $p < .001$. Therefore, increased misophonia symptomology is associated with increased anxiety on both DMQ composite scales.

We also examined how DMQ Composite Scales correlated with BDI scores. First, we found a very strong, positive, and significant correlation between BDI scores and DMQ SS scores, $\rho(1609) = .46$, bootstrapped 95% CI [.42, .50], $p < .001$, showing that as misophonia responses become more severe, levels of depression also rise. We discovered a strong, positive, and significant relationship between DMQ SC scores and BDI scores, $\rho(1609) = .34$, bootstrapped 95% CI [.30, .39], $p < .001$. These findings suggest an intimate link between misophonia and depression, such that those who suffer more from misophonia also suffer more from depression. Figure 2 illustrates all relationships between misophonia severity and coping abilities and mental health.

FIGURE 2 HERE

DMQ Severity & Coping Scores and Mental Health

Hyperacusis and Mental Health Correlations

To examine the relation between anxiety and hyperacusis symptomology, we correlated BAI scores with IHS scores. There was a very strong, positive, and significant correlation, $\rho(1738) = .52$, bootstrapped 95% CI [.48, .55], $p < .001$, such that anxiety increased as hyperacusis symptomology increased. We also investigated the relation between depression and hyperacusis symptomology. A very strong, positive, and significant correlation, $\rho(1851) = .41$, bootstrapped 95% CI [.37, .45], $p < .001$, was found between BDI and IHS scores. Similarly to

DMQ scores, as hyperacusis symptomology increases, so do instances of mental health disorder symptomology. Figure 3 displays the relationship between hyperacusis and depression and anxiety. Table 2 provides a summary of all correlations.

FIGURE 3 HERE

IHS Scores and Mental Health

TABLE 2 HERE

DST and Mental Health Spearman's Correlations

Discussion

Main Findings

The current study sought to examine the relationship between DST and mental health challenges in Canadian undergraduates. We hypothesized that those with higher levels of misophonia and hyperacusis symptomology would show increased levels of depression and anxiety. This hypothesis was supported by moderate to very strong correlations, highlighting a positive relationship between DST symptoms and depression and anxiety. For depression and anxiety, those with clinically significant levels of misophonia scored significantly higher than those with sub-clinical or non-clinical misophonia, further supporting the notion that higher levels of DST relate to higher levels of mental health difficulties. Since large sample sizes can increase the likelihood of Type I errors, we examined effect sizes for all ANOVAs and post-hoc tests. We consistently found large effect sizes, showing the robustness of these effects. These results inform various challenges for those with DST and future directions for researchers, clinicians, university administrators, and educators. Namely, we discuss accommodating DST in post-secondary institutions, treatments within universities, the role of educators in making

academic settings more welcoming, social factors in DST possibly worsening mental health outcomes, and future research directions.

Prevalence & Novel Contributions

Our study uniquely contributes to the literature in a few ways. First, this is a novel study examining DST and mental health in Canadian undergraduates. Our findings benefit from a non-biased sampling method and updated, psychometrically validated measures (Rosenthal et al., 2021; Williams et al., 2022) designed with the recent misophonia consensus definition (Swedo et al., 2022). Since past work recruited samples with existing DST subtypes (e.g., Goebel & Floetzinger, 2008) and knowledge of DST, the prevalence and outcomes of DST are not always evaluated in a truly general population. The current study did not mention DST in the study advertisement, ensuring we sampled students who did not opt to participate based on their own experience with DST, making our findings generalizable and representative of DST in Canadian undergraduates. Recruiting samples with DST subtypes also often results in a sample with a higher average age since DST subtypes (especially hyperacusis) often cooccur with hearing difficulties and tinnitus, more often found in older adults (Paulin et al., 2016). Here, participants were, on average, younger than in past work. Our data show that over 13% of undergraduate students experience clinically or sub-clinically significant symptoms (on the DVMSQ) of misophonia, while almost 16% experience severe hyperacusis (on the IHS). For a more detailed discussion of DST prevalence in this sample, see Manning et al. (2025; under review). This finding suggests that DST is a prevalent condition experienced by many Canadian university students. Since DST has not received adequate research attention in Canadian universities, there is inadequate support for those with DST. The lack of support in Canadian institutions may worsen the outcomes of those with DST, contributing to the mental health difficulties reported

here. Therefore, students suffer in silence when attending institutions that may be unintentionally making their learning experience undesirable.

Accommodation & Treatment Suggestions

Those with DST face unique challenges that harm various facets of their life. Earlier work shows that DST symptoms are linked to anxiety, depression, and personality disorders (Jager et al., 2020; Rouw & Erfanian, 2018). In the current work we show that both misophonia and hyperacusis exert strong, positive influences on mental health difficulties. Although past research suggests that misophonia and hyperacusis have distinct mechanisms (Swedo et al., 2022), our data suggest that, due to similar mental health outcomes, those with misophonia and hyperacusis could benefit from similar accommodations. Therefore, the below suggestions should not be limited to one DST subtype but extended to misophonia and hyperacusis sufferers alike. However, this suggestion yields some caution since past work suggests certain treatments can make misophonia symptoms worse (Claiborn et al., 2020). The similar outcomes of misophonia and hyperacusis suggest that treating one DST subtype (e.g., with exposure therapy) might make the experience of the other worse. Future research should examine how to treat DST subtypes in isolation, and clinicians should exercise caution when choosing which DST treatments to administer.

In an already difficult academic environment, DST can make mental health challenges worse. Students are not receiving adequate care, evidenced by DST symptoms scaling with increased mental health challenges in the current study. Universities must amend their policies, accommodations, and services to support those with DST. For example, examination accommodations present incredible challenges for those with DST. Many accommodations require that students show proof of their condition. However, since many physicians are

unfamiliar with DST, obtaining documentation can be strenuous. Once students obtain permission for accommodations, accommodated classrooms present no guarantee that trigger sounds will be completely absent or that seating plans will not place those with DST near noisy parts of a room.

Universities must also extinguish pejorative examination guidelines that condemn aids like non-Bluetooth noise-cancelling headphones. The policing of examination aids in universities implicitly suggests that those with sensory sensitivities must assimilate into academic frameworks and adopt coping techniques that only the institution deems fit. These outdated mandates may reinforce a socially isolating conception of DST sufferers in their peers. That is, in those with an incomplete understanding of DST, the villainizing of (say) headphones while writing an exam induces a bias that someone with DST receives privileged treatment when, in reality, they are coping with aversive stimuli. These biases stem from outdated conceptions of what is allowed in exam rooms. Post-secondary institutions must rapidly phase out these obsolete policies so those with DST can succeed academically and enjoy social cohesion with their peers.

A concerning finding in the DST-mental health literature is that those with DST are unlikely to seek treatment for their condition. Earlier work surveying a sample of people with sound sensitivity (N = 1,053) shows that most respondents (74.9%) seek no treatment for misophonia (Claiborn et al., 2020). This result is not explained by misophonia being unbothersome in this sample since respondents reported obtrusive physical sensations (20.5%) and reactions (up to 86%) to trigger sounds and decreased quality of life, compared to a community sample (difference $d = 1.22$). Our sample may face a greater discrepancy in prevalence and treatment since students are in new environments where support is unfamiliar. Earlier work shows that second-year medical students score higher on depression measures than

medical school seniors (Almadani et al., 2024). While there are age differences, this effect is likely present in our sample since undergraduates, like medical students, are entering new contexts. Universities must adopt new on-campus services for those with DST. Adding new services should be streamlined since universities already offer services to treat physical and mental malaises such as counselling or physiotherapy. Since DST has debilitating effects on many students, DST deserves the same treatment priority.

Researchers have investigated treatments for DST. Past work found improvements in 48% of misophonia patients after eight cognitive behavioural therapy (CBT) sessions, with misophonia decreases, and increases in perceived improvement scales (Schröder et al., 2017). Other work shows that CBT has promising short-term and long-term effects for those with misophonia, with 37% of patients no longer meeting misophonia criteria after treatment (Jager et al., 2020). This result comes from a randomized clinical trial (RCT), building on a body of (albeit non-RCT) literature also emphasizing the efficacy of CBT for DST (e.g., Bernstein et al., 2013). Now, approximately 8% of people with sound sensitivities seek treatment via CBT (Claiborn et al., 2020), but we suggest that universities implement this treatment and apply its useful effects to students. Other work shows that seeking pharmacological treatment for depression and anxiety can improve misophonia symptoms (Claiborn et al., 2020). Interestingly, this finding shows how misophonia and mental health challenges are intricately linked, such that treating undesirable outcomes associated with misophonia can reduce the hypothesized catalyst. While those with DST have tried a host of other treatments ranging from naturopathic medicine to exposure therapy, these treatments generally do not improve misophonia (Claiborn et al., 2020). Some treatments, like talk therapy or counselling, can *worsen* misophonia (Claiborn et al., 2020). Overall, more work needs to investigate effective DST treatments that improve

symptomology and quality of life, as most current strategies are unsuccessful in these domains. Universities should prioritize and implement evidence-based DST treatments when distributing resources to on-campus wellness services.

The Role of Educators

So far, our suggestions for improving university life for those with DST urge university administrators, policymakers, and funding managers to allocate resources and make changes for students with DST. This "top-down" approach can be flawed because DST is an urgent problem in Canadian post-secondary institutions, and these improvements will take time. Therefore, we also suggest a "bottom-up" approach where those immediately involved in the university experience of those with DST can play a role.

Previous work in education research suggests that students may learn best when pedagogical frameworks account for natural fluctuations in attention (Keller et al., 2020). Here, researchers adopt evidence from neuroscience showing that student attention naturally sways throughout a lecture (Fiebelkorn et al., 2018). They describe teaching strategies such as implementing time for quiet reflection, allowing students to consider their ideas and share with a peer (Keller et al., 2020). This technique lets students shift their attention inward while integrating previously learned concepts. We suggest that this could be an effective strategy for post-secondary educators since it accommodates natural attentional fluctuations in all lecture attendees and can provide auditory relief for those with DST while facilitating an active learning process, crucial for reflection and critical thinking (Tanner, 2013). Quiet reflection time is increasingly relevant since research shows that university lectures are consistently noisy, with few quiet periods (Owens et al., 2017). Further, earlier work shows cooccurrences between misophonia and attention deficit (hyperactivity) disorders (AD(H)D), meaning that those with

these conditions would doubly benefit from attentional and sound accommodations that introduce periods of silence (Jager et al., 2020; Rouw & Erfanian, 2018). Instructors should, however, be cautious of the kind of active learning techniques they implement since some forms of peer discussion could make classrooms noisier (Owens et al., 2017). Allowing students to quietly ponder material and write their thoughts down for an “exit paper" submitted at the end of class could maintain quiet while assessing student engagement through active learning.

Researchers also discuss how environmental sounds can trigger *off-topic external* attentional modes, introducing variability in how students retain or absorb material (Keller et al., 2020). This attentional co-opting may be heightened in those with DST as auditory stimuli are salient. University instructors may consider shifting their lecture style so that external attention can fluctuate on-topic and off-topic (Keller et al., 2020). Another teaching style emphasizes placing attentional demands on one attentional domain at a time (Keller et al., 2020). Adopting a growth mindset in the classroom can also foster understanding and compassion for students who are heavily swayed by distracting stimuli (Dweck, 2008; Keller et al., 2020).

Social DST Outcomes Influencing Mental Health

Mental health challenges may stem from social isolation due to DST coping strategies. Earlier work elucidates the debilitating effects of DST on social skills for undergraduates (Wickie et al., 2025; under review). An inverse relationship between DST symptoms and social competence suggests that DST can also interfere with social engagements (Manning et al., 2025; under review). Often, those with DST do not engage in social events because of the likelihood of adverse auditory stimuli. The mood-disrupting features of responses to auditory stimuli (Wu et al., 2014) may also bias those with DST towards cancelling plans with others, for example. However, another interpretation is that those with DST may face heightened discrimination

among peers. Since many people with DST use headphones or other noise-blocking devices to cope with aversive sounds (Scheerer et al., 2024), others may interpret DST sufferers as being socially reclusive. Support for this notion comes from open-ended DST self-reports where respondents primarily wished that consistently using headphones was more socially accepted or that noise-limiting devices did not have to go on the ear (Scheerer et al., 2024). With increased public awareness and acceptance, coping in this way need not be a socially limiting factor for those with DST. However, this optimistic outcome must come from the top down. Increased public communication about DST can lead to a cultural embrace surrounding the preferred coping strategies of those with DST. Further education and research about DST and the downstream effects on social, academic, occupational, and psychiatric outcomes will benefit DST sufferer's daily experiences. Researchers must also continue examining and classifying other DST subtypes, making diagnoses, treatment, and management accessible.

Mediation & Causality

The current work produces interesting questions about *how* DST fosters mental health challenges. As discussed, a host of debilitating factors can impact the lives of those with DST. However, it is unclear whether social and academic difficulties (for example) or DST itself influence mental health challenges. Since DST work is often correlational, it is difficult to determine if hindrances caused by DST influence the relationship between DST and mental health. Past work has found a partially mediating effect of anxiety on the relationship between personality disorder symptoms and misophonia (Cassiello-Robbins et al., 2021). This study suggests that mental health difficulties can be a facilitating factor for misophonia. However, the researchers used non-updated misophonia measures (MQ; Wu et al., 2014) and a non-undergraduate sample. Future work should examine mediating factors between DST and mental

health challenges using psychometrically validated and up-to-date DST measures in unexamined post-secondary institutions to disentangle causation from relation in the DST-mental health literature.

Further, researchers must conduct experimental work to isolate DST as the root cause of mental health struggles. Since the current work is correlational and did not measure the life-impacting effects of DST, our data cannot pinpoint various causal or mediating effects. What is clear, however, is that DST fosters an environment for developing mental health disorders through either DST itself or other life difficulties. Developing strategies to locate these underlying driving factors will prove beneficial in treating DST.

Limitations

Our study was limited in a few ways. First, our data rely on self-report measures. Estimations of mental health challenges and DST relied on the beliefs of respondents. We implemented rigorous data integrity checks to limit the effects of careless responses. Still, there is a possibility that some measures are over or underestimated. For example, anxiety and depression estimates may differ if assessed through a clinically structured interview (Cassiello-Robbins et al., 2021). Overestimations may exist for anxiety since research shows that those with DST experience mostly anticipatory anxiety rather than trait-like anxiety (Jager et al., 2020). Since we did not assess anxiety in the context of triggering stimuli, the kind of anxiety measured here is not specific to misophonia triggers. Further, past research suggests that self-reports of misophonia can be misleading since other symptoms could better explain misophonia symptoms (Jager et al., 2020). However, the most recent consensus definition of misophonia posits that psychological, psychiatric, or auditory disorders *do not* better explain misophonia symptoms

683 (Swedo et al., 2022). Aligned with the consensus of experts, we agree that other disorders do not
684 better explain misophonia self-reports in the current study.

685 This study aligns with the DST-mental health literature in that most DST work follows
686 this self-report approach. Our study differs since we used the most updated misophonia measures
687 that are psychometrically validated and aligned with the current consensus definition. Further,
688 online self-reports allowed us to gather the largest sample in the DST-mental health literature.

689 Another limitation was the use of the BDI. Despite the development of the Beck
690 Depression Inventory-II (Beck et al., 1996), we implemented the BDI. While more recent work
691 shows that the BDI has strong internal consistency and a single factor structure (Faraci & Tirrito,
692 2013), an updated depression measure like the PHQ-9 may have yielded results more consistent
693 with the current depression literature. It is possible that the BDI underestimated the prevalence of
694 depression in the sample since there is a large discrepancy between depression (6% of the
695 sample) and anxiety (24% of the sample) despite the theoretical relationship and comorbidity of
696 these conditions. Future work investigating DST and mental health should use updated DST
697 measures with recent mental health questionnaires so that the literature can build on recent expert
698 consensus, allowing for generalizable findings.

699 Finally, the current study did not include the full scope of the demographic measures
700 collected from participants' survey completion. We collected demographic information regarding
701 age, gender, sex, and ethnic background, but only describe age and gender in the main text since
702 this information best aligns with our research aims. Participant age was important to this work
703 since previous research rarely examines DST in undergraduate populations and DST subtypes
704 like hyperacusis are often evaluated in older adults (Paulin et al., 2016). Gender was of interest
705 since past work also suggests that DST is more severe in women and girls (Simner & Rinaldi,

2023), although we did not investigate this trend. Further, ethnic background did not play role in the aims of the current work and therefore was not included in our analyses. This study is also limited since we did not collect socioeconomic or educational information, as well as income measures. We can infer that students in this study are at about the same educational level since they were all enrolled in an undergraduate program. However, income level, ethnic background, and socioeconomic status could be rather variable and any inference regarding the similarity of students here would be speculative. Overall, where fit, future work should consider various demographic factors when examining DST since they may play a key role in DST symptoms and mental health outcomes.

Conclusion

Overall, the current study shows that DST is a concerning, prevalent condition in Canadian universities, and its impact is associated with mental health challenges in sufferers. We present the most extensive sample in the DST-mental health literature and, more broadly, one of the largest samples studying DST to date. Further, we used the most recently developed misophonia measures that, until this point, had not assessed DST and mental health. Based on our data, we urge post-secondary institutions to treat DST as a health concern on university campuses while improving classroom policies and wellness practices. We offer educational insights so that instructors can amend their teaching styles to accommodate those with DST. We suggest that researchers focus on applied domains to alleviate social suffering associated with coping strategies. Finally, we stress fundamental research pathways investigating correlates and causes of DST subtypes and their influence on mental health.

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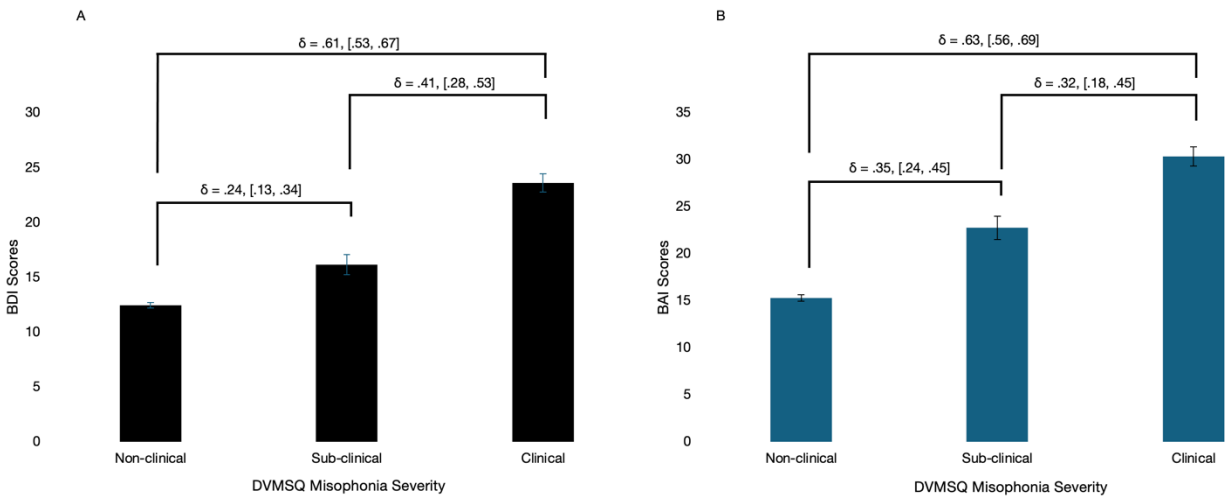
Figures and Tables

Figure 1

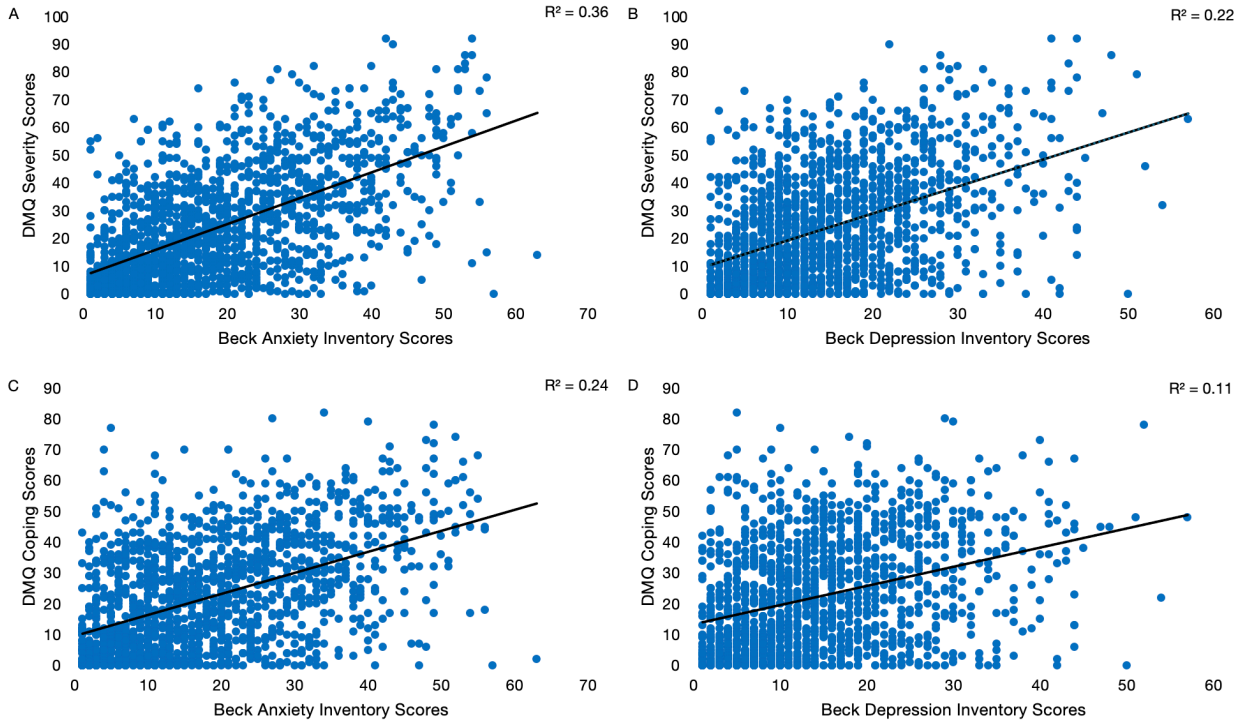
DVMSQ Severity and Mental Health



Note. Depression and anxiety scores at varied levels of DST severity. (A) The effect of misophonia severity, measured by the DVMSQ, on depression scores. (B) The effect of misophonia severity, measured by the DVMSQ, on anxiety scores. Cliff's Delta (δ) denotes effect sizes for each comparison. Precision of effect size estimates indicated by 95% CIs. All comparisons were significant at $p < .001$. Error bars represent the standard error of the mean (SEM). BDI = Beck Depression Inventory; BAI = Beck Anxiety Inventory.

Figure 2

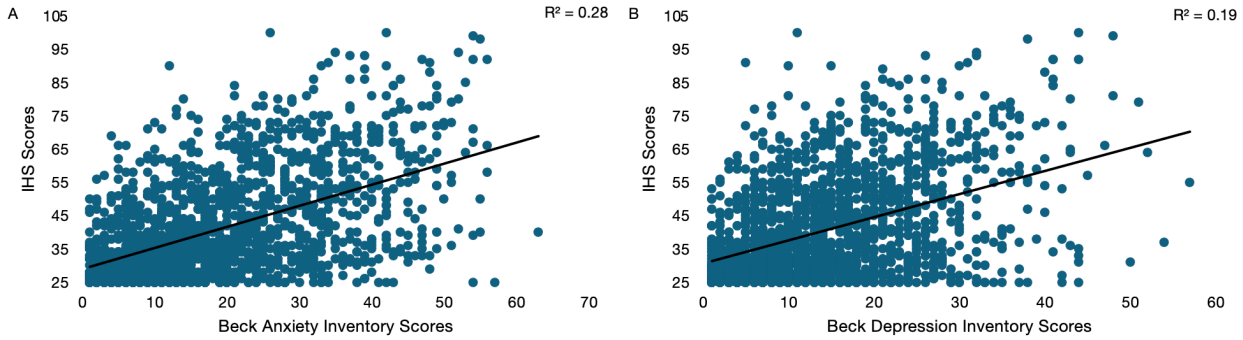
DMQ Severity & Coping Scores and Mental Health



Note. Correlations between misophonia severity and coping abilities and mental health. (A) The relation between DMQ Severity Composite scores and BAI scores. (B) The relation between DMQ Severity Composite scores and BDI scores. (C) The relation between DMQ Coping Composite scores and BAI scores. (D) The relation between DMQ Coping Composite scores and BDI scores. DMQ = Duke Misophonia Questionnaire; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory.

Figure 3

IHS Scores and Mental Health



774

775 *Note.* Correlations between hyperacusis symptoms and mental health. (A) The relation between

776 IHS scores and BAI scores. (B) The relation between HIS scores and BDI scores. IHS =

777 Inventory of Hyperacusis Symptoms; BAI = Beck Anxiety Inventory; BDI = Beck Depression

778 Inventory.

779

780 **Table 1**

781 *Descriptive Statistics*

Variable	*n*	*M*	*SD*	Range	Percentage (%)
Gender	2095				
Male	1615				
Female	436				
Other	44				
Age	2060	21.70	2.73	42	
BAI Total	1842	18.58	12.86	62	
BDI Total	1970	14.44	9.53	56	
DMQ SS	1699	23.12	19.82	92	
DMQ SC	1699	21.95	17.86	82	
IHS Total	1968	40.25	15.15	75	
DVMSQ Clinically Significant Misophonia	165				8

Variable	*n*	*M*	*SD*	Range	Percentage (%)
DMQ Clinically Significant Misophonia	325				16
IHS Clinically Significant Hyperacusis	327				16
DMQ Clinically Significant Misophonia & IHS Clinically Significant Hyperacusis	206				10

Note. Some variables are missing measures of central tendency because of measurement on a nominal scale. For Gender: "Other" includes 21 non-binary, 12 transgender, 7 "prefer not to answer", 2 gender fluid, 1 gender binary, and 1 "I do not know" individuals. BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; DVMSQ = Duke-Vanderbilt Misophonia Screening Questionnaire; DMQ = Duke Misophonia Questionnaire; IHS = Inventory of Hyperacusis Symptoms.

Table 2

DST and Mental Health Spearman's Correlations

Variable		BAI Score	BDI Score	DMQ Severity Score	IHS Score	DMQ Coping Score
1. BAI Score	n	—				
	Spearman's rho	—				
2. BDI Score	n	1754	—			
	Spearman's rho	0.57***	—			
3. DMQ Severity Score	n	1521	1609	—		

DST and Mental Health Spearman's Correlations

Variable		BAI Score	BDI Score	DMQ Severity Score	IHS Score	DMQ Coping Score
4. IHS Score	Spearman's rho	0.59***	0.46***	—		
	n	1738	1851	1618	—	
5. DMQ Coping Score	Spearman's rho	0.52***	0.41***	0.82***	—	
	n	1521	1609	1699	1618	—
	Spearman's rho	0.48***	0.34***	0.81***	0.78***	—

Note. BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; DMQ = Duke Misophonia Questionnaire; IHS = Inventory of Hyperacusis Symptoms * $p < .05$, ** $p < .01$, *** $p < .001$

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