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EXAMINING THE RELATIONSHIP BETWEEN MISOPHONIA AND DEPRESSION

by

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A thesis submitted to the faculty of the University of Mississippi in partial fulfillment of the requirements of the Sally McDonnell Barksdale Honors College

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ABSTRACT

Because research on misophonia is in its early stages, few studies have examined correlations with other disorders. Misophonia has been shown to co-occur with a variety of anxiety-related and mood disorders. Understanding the link between depression and misophonia is important because both disorders contribute to significant impairment in daily work, social, and role functioning. This study aims to examine the relation between misophonia and depression in a community sample, which would expand knowledge demonstrated by previous studies using clinical and college samples. We hypothesized that misophonia and depression would have a positive correlation and that women would experience higher levels of misophonia and depression severity than men. A community sample from the Lafayette-Oxford-University and surrounding areas ($N = 66$) completed self-report measures of demographic characteristics, misophonia severity (Amsterdam Misophonia Scale), depression severity (Patient Health Questionnaire-9) and overall impairment (Work and Social Adjustment Scale). This sample identified as 83.3% female and 78.8% white, with a mean age of 28 ($SD = 11.8$). A large portion of participants reported moderate misophonia severity ($n = 29, 43.9\%$), minimal depression severity ($n = 22, 33.3\%$), and clinical levels of impairment in social, work, and role functioning ($n = 31, 47.0\%$). Bivariate correlations indicated non-significant correlations between misophonia and depression ($r = 0.219, p < 0.87$). Further analysis revealed significant correlation between misophonia severity and depressed mood ($r = .235, p < .05$), sleep difficulties ($r = .262, p < .05$), eating difficulties ($r = .253, p < .05$), and worthlessness ($r = .272, p < .05$) on the PHQ-9. An independent samples T-Test was conducted to determine whether or not women reported

higher levels of depression and misophonia than men. The results indicated that this hypothesis was not supported as there was no significant difference between men and women in misophonia ($M = 11.6, SD = 2.4; t [60] = .11, p = .915$) and depression ($M = 9.3, SD = 5.6, t [63] = .58, p = .562$). Inconsistent with prior work, findings indicate that misophonia and depression severity did not have a positive correlation, which does not support hypothesis one. Hypothesis two was also not supported by the data. However, nearly 40% this sample of individuals with misophonia endorsed clinical levels of depression, suggesting that while misophonia and depression severity were not significantly associated, there is a high level of depression among individuals with misophonia. The lack of support for hypothesis two may be attributed to the uneven distribution of gender in the sample. Given the limitations of this study, further examination of the relationship between misophonia and depression, and how gender may influence these correlations is needed.

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Introduction

Misophonia is characterized by a trigger sound or sounds, as well as psychological, physiological, and behavioral symptoms that impact a person's daily life (Dozier et al., 2017). Sounds that commonly trigger misophonic responses include sniffing, clearing the throat, chewing, mouth breathing, and repeating clicking noises (Hansen et al., 2021). The prevalence of misophonia is estimated to be between 12.8%-20% (Kılıç et al., 2021; Potgieter et al., 2019). Previous research has shown younger aged individuals, between 15-25 years, individuals with a family history of misophonia, and females are more likely to exhibit misophonia and misophonic symptoms (Kılıç et al., 2021; Naylor et al., 2021); yet, the age of onset, chronicity and prevalence rates by gender are highly variable (Edelstein et al., 2013). The chronicity of misophonia varies depending on both an individual's environment and their prolonged exposure to trigger sound(s) (Cavanna, 2014). Individuals experience distress and impairment on a spectrum of severity ranging from mild to severe, which is defined by overall time of preoccupation with sound trigger(s), interference in daily life including avoidance behaviors, and distress caused by trigger sound(s) (Naylor et al., 2021; Swedo et al., 2022). Although misophonia has not yet been included in the Diagnostic and Statistical Manual of Mental Disorders (DSM) or the ICD due to the need for continued research to further inform the etiology, symptoms, and treatment options, research points to a consistent pattern of symptoms that is unique from other disorders (Swedo et al., 2022).

There is a consistent pattern of behavioral and physiological symptoms that characterize misophonia as a specific, unique disorder. In terms of symptoms of misophonia, a person must demonstrate an extreme reaction to one or more sounds, at regular frequency and intensity (Edelstein et al., 2013). The trigger sound must cause a reaction when experienced as an audibly,

visually, or both (Dozier et al., 2017). Psychological symptoms of misophonia can include anxiety, anger, disgust and a strong emotional reaction to trigger sound(s), dysregulation of emotions and thoughts, and/or distress (Dozier et al., 2017; Dozier & Morrison, 2017). Those with misophonia typically experience an autonomic arousal response, “fight or flight”, when faced with their trigger sound(s) (Vanaja & Abigail, 2020). Physiological symptoms are expressed by increased heart rate and sweating, tenseness of the shoulders and/or neck, clenched jaw, and a variety of other physical reactions (Dozier & Morrison, 2017). Behavioral symptoms include avoidance of sounds and stimuli, difficulty performing at work, aggressive outbursts, school, home, or difficulty interacting with certain groups of people. These behavioral and psychological symptoms must impose significant impairment in the person’s life, in that they are unable to function normally when compared to control groups (Dozier et al., 2017).

Symptoms of misophonia are similar to other disorders, particularly audiological conditions and anxiety-related disorders. Audiological conditions such as tinnitus and hyperacusis has also been observed in individuals with misophonia or misophonic experiences (Potgieter et al., 2019). Previous studies reported some individuals with misophonia experience tinnitus or impaired hearing abilities, though there is little evidence to suggest potential associations between misophonia and audiological conditions (Potgieter et al., 2019). The co-occurrence with anxiety-related disorders has been primarily found in generalized anxiety disorder (GAD), phonophobia, obsessive-compulsive disorder (OCD), and post-traumatic stress disorder (PTSD) (Erfanian et al., 2019). There are a number of similarities such as the obsession with stimuli, avoidance behaviors, and physiological reactions that are experienced by those with misophonia these disorders (Erfanian et al., 2019). The primary difference between misophonia and other anxiety-related disorders is the specific trigger sound.

Misophonia Co-occurrence

Misophonia has been found to commonly co-occur with psychological disorders. The co-occurrence of misophonia with other conditions is thought to be due to commonality of symptoms with several psychological disorders; however, the co-occurrence of disorders varies across individuals (Erfanian et al., 2019; Rosenthal et al., 2022). One study examined a sample of clinical, adult participants and found that PTSD, OCD, and MDD had the highest rates of co-occurrence with misophonia (Erfanian et al., 2019). Similarly, another clinically-focused study found high rates of co-occurrence between misophonia and depression and/or anxiety, and found that individuals commonly reported struggles with creating and maintaining interpersonal relationships (Natalini et al., 2020). Previous research has shown that misophonia is can be comorbid with obsessive-compulsive disorder and trauma-related disorders and that nearly 6.8% of individuals in samples also have major depressive disorder (Erfanian et al., 2019; Jager et al., 2020). Misophonia is also known to co-occur with a variety of anxiety disorders, with nearly 56.9% of samples meeting criteria for at least one anxiety-related disorder (Rosenthal et al., 2022). Social anxiety disorder was the most reported anxiety-related disorder to co-occur with misophonia, with nearly 30.9% of a sample meeting full criteria for social anxiety, followed by 24.6% of participants meeting criteria for generalized anxiety disorder (Rosenthal et al., 2022). Lastly, misophonia has been shown to co-occur with a multitude of other disorders, including eating disorders (9.61%) and mood disorders (9.61%; Erfanian et al., 2019; Jager et al., 2020).

Misophonia has also been shown to co-occur with depression. One study found that persistent depressive disorder and major depressive disorder both had the most significant impact in terms of influence on misophonic symptom severity (Rosenthal et al., 2022). In one study

examining a community sample of individuals with misophonia, social anxiety, GAD and MDD were identified as the most common disorders to co-occur with misophonia (Rosenthal et al., 2022). Previous research on participants in a clinical patient setting has reported severity of misophonic symptoms negatively correlates with quality of life, which could potentially provide an explanation for the high rates of misophonia and depressive disorder(s) co-occurrence (Jager et al., 2020). Similarly, a study on participants in a clinical setting also found high rates of co-occurrence between misophonia and MDD, OCD, and/or PTSD (Erfanian et al., 2018). Despite the evidence of a potential co-occurrence between misophonia and depression, there remains very few studies that have examined the association between misophonia and depression symptoms, as well as the factors that influence this relationship. Therefore, it is necessary to further examine depression and its co-occurrence with misophonia in order to further inform how the two disorders may influence one another and how this relationship may influence a person's day-to-day life.

Major Depressive Disorder

Major Depressive Disorder (MDD) is characterized by feelings of worthlessness, hopelessness, loss of pleasure or interest in activities, sadness, and irritability, as well as multiple physical symptoms (APA, 2022; McCarter, 2008). MDD is a highly prevalent diagnosis globally, with approximately 4.7-9% of the global population estimated having experienced MDD (Ferrari et al., 2013; Lépine & Briley, 2011). Depression is associated with impairment in social functioning and roles, primarily due to the feelings of worthlessness and loss of pleasure in activities (Kupferberg et al., 2016). There are several risk factors that predispose individuals to MDD. Notably, a history of anxiety and/or eating disorders, as well as being female, are two major risk factors in the development and experience of a depressive episode (McCarter, 2008).

Rates of MDD are typically highest among middle-aged individuals, typically ranging between those in their mid-20s to early 40s (McCarter, 2008). The ratio of female to male MDD diagnosis was approximated to be 1.64:1 (Romans et al., 2007), with nearly 0.05% having experienced a depressive episode. Overall, women are more likely to experience suicidal ideation or thoughts of death, loss of pleasure or interest in activities, increased appetite, and social impairment when compared to men (Romans et al., 2007).

MDD has been shown to have high co-occurrence rates with other psychological and medical disorders. For instance, MDD co-occurs with generalized anxiety disorder and other anxiety-related disorders, as well as alcohol use disorder and several chronic health conditions such as cardiac disease(s), hypertension, hyperlipidemia, and arthritis (Jolles et al., 2015; Mathew et al., 2011; McCarter, 2008; Samokhvalov et al., 2017). The high rates of co-occurrence are thought to be due to similarities in symptoms and can also be explained by the shared etiology model (Mathew et al., 2011; Neale & Kendler, 1995). The shared etiology model states that a common set of risk factors can lead to the development of multiple disorders, particularly anxiety and depression (Mathew et al., 2011; Neale & Kendler, 1995). For instance, severely stressful life events, family dysfunction, and troubles in social settings are known risk factors for both MDD and anxiety-related disorders, leading to the possibility of co-occurrence due to this sharing of risk factors (Mathew et al., 2011). Critical to this study, MDD has also been shown to co-occur with misophonia, with a study reporting nearly 6.8% of individuals seeking treatment for misophonia meeting criteria for MDD (Jager et al., 2020).

Misophonia and Depression

Although misophonia is known to co-occur with a multitude of disorders, the relationship between misophonia and depression has not been fully explored nor is it fully understood.

Misophonia and depression have been hypothesized to co-occur due to misophonia's effect on social functioning and interpersonal relationships (Erfanian et al., 2019). For instance, the avoidance associated with misophonia, such as staying home and avoiding certain people may influence loneliness and lead to feelings of depression. The relation of the two disorders may be influenced by either direct or associative relationships. That is, one set of symptoms may lead to another disorder or the two disorders may be related by having similar symptoms and behaviors that connect them (Wu et al., 2014). Several studies have examined the relationship and rates of co-occurrence between misophonia and depression (Alecri & Al Saif, 2019; Jager et al., 2020; McKay et al., 2018; Wu et al., 2014). Depressive symptoms have been found to be common among individuals with misophonia, with some studies reporting that nearly 7% of individuals with misophonia also experience depression (Jager et al., 2020) and that depressive symptoms are significantly associated with misophonia symptoms (Wu et al., 2014). In a clinical study, misophonia and depression were found to co-occur in 6.8% of the sample, $n = 575$ (Jager et al., 2020). Similarly, a study performed by McKay et. al found significant correlations between misophonia and experiences of depression within a community sample (McKay et al., 2018). A clinical case study has also reported that misophonia can influence feelings of suicidality (Alecri & Al Saif, 2019).

There are many factors that are hypothesized to lead the high co-occurrence between depression and misophonia. For instance, avoidance behaviors caused by misophonia, which in turn leads to loneliness and depressive mood states. In particular, misophonia has been shown to be associated with avoidance of social situations and issues in relationships with others due to the avoidance of trigger sound(s) (Erfanian et al., 2019). This consistent isolation in turn may lead to experiences of depressive mood due to struggles in social, work and role functioning

(Erfanian et al., 2019; Jager et al., 2020). Alternatively, certain factors such as emotional dysregulation may underlie both misophonia and depression, which may lead to increased vulnerability for both of these disorders (Erfanian et al., 2019). Indeed, emotional dysregulation may contribute to distress caused by trigger sound(s) among individuals with misophonia, which also influences feelings of depression as emotional and behavioral reactions to trigger(s) cause cognitive and social impairment (Erfanian et al., 2019; Jager et al., 2020). In addition, there are overlapping symptoms between misophonia and depression. Previous research has shown that misophonic experiences lead to increased irritability, depressed mood, as well as a lack of or disturbed concentration, all of which are known symptoms of MDD (Erfanian et al., 2019; Wu et al., 2014). Lastly, misophonia and depression share risk factors. Research has shown that misophonic symptoms and experience severity is higher in females (Erfanian et al., 2019). Gender, a known risk factor for multiple psychological disorders including major depressive disorder, arguably influences the relationship between misophonia and experiences of depression (Erfanian et al., 2019; McCarter, 2008). Females have reported higher rates of both depression and misophonia (Erfanian et al., 2019; McCarter, 2008). Although there are no prevailing theories on the causes of the co-occurrence between misophonia and depression, the commonalities shared between both disorders can provide some insight into the high rates of co-occurrence and experiences of both disorders (Erfanian et al., 2019; Jager et al., 2020; Wu et al., 2014).

Aims of Current Study

The study of misophonia is a relatively new field (Swedo et al., 2021). Previous literature examining misophonia have been primarily clinical or college sample-based, leaving little information on misophonia prevalence and characteristics within a community sample (Dozier et

al., 2017; Edelstein et al., 2013; Kılıç et al., 2021). Community samples offer a unique insight into misophonia and other disorders, as within clinical samples, individuals are reporting for treatment for symptoms, which means that they may have unique characteristics in relation to their personal characteristics and the distress experiences. In a similar vein, many studies have relied on college samples, which are limited by the range of socio-demographic characteristics (e.g., young, predominantly female). There are also few studies on the co-occurrence of misophonia and MDD. Therefore, the goal of this study is to evaluate the associations between misophonia and depression. In addition, this study will examine the influence of gender in relation to misophonia and depression. First, it was predicted that misophonia symptoms and experiences will be positively associated with depression symptoms. Second, it was hypothesized that women will have higher levels of misophonic and depressive symptoms than men as previous findings have shown higher rates of these disorders in women (Erfanian et al., 2019; McCarter, 2008).

Methods

Participants

Participants ($N = 66$) were recruited from the Lafayette-Oxford-University region through advertisements, flyers, announcement boards, and by word of mouth. Individuals who expressed interest in the study through an online survey were then contacted by study personnel to undergo screening to determine eligibility. Eligibility was determined by administration of the Amsterdam Misophonia Scale (A-MISO-S) questionnaire, with a score of 10 or higher and the endorsement of at least one trigger sound required. Individuals were also subject to inclusion criteria, including: (1) aged 18 to 65 years, and (2) normal hearing and vision. Exclusion criteria included (1) inability to complete study due to time commitments or prior-known scheduling conflicts, (2) inability to complete English-language questionnaires, and (3) current psychopathology that could impact study participation, including primary psychosis, current manic episode, current substance use, primary diagnosis of autism spectrum disorder, and evidence of danger to self or others. Following eligibility determination by the screener, participants were scheduled for a two-hour study session with either a graduate experimenter or the principal investigator. Upon completion of the study session, participants were compensated \$25. All study protocols and procedures were approved by the University of Mississippi's Institutional Review Board (IRB) and funded by the Misophonia Research Fund (MRF) grant. The data in the current study is part of a larger project, which includes two session appointments and a hearing evaluation; however, only the self-report data from the first session were examined in this study.

In the final sample of participants ($N = 66$), most participants were female (83.3%, $n = 55$), with the average age of 28-years-old ($SD = 11.89$) and a majority identified as white (78.8%, $n = 52$). See Table 1 for a summary of participant demographic characteristics.

Procedures

Data collection for this study began in October of 2021 and is ongoing. The current study was part of a larger project examining the characterization of misophonia and includes procedures that go beyond the scope of the current project. A self-report screener of COVID-19 symptoms was administered to participants upon arrival to ensure no new symptoms had developed for the safety of both the experimenter and participant. First, the researcher reviewed the consent form, and written informed consent was obtained. Next, participants were asked to complete a self-report packet of questionnaires, including the Misophonia Questionnaire (MQ), the A-MISO-S, the Patient Health Questionnaire-9 (PHQ-9), and the work and social adjustment scale (WSAS).

At the end of the session, the experimenter reviewed the self-report measures, and a second stage screening was conducted. Participants were then informed of their eligibility status and scheduled for the remaining sessions, or debriefed if eligibility requirements were not met. Participants were compensated \$25 for completion of this session.

Measures

The Amsterdam Misophonia Scale (A-MISO-S) is a Likert-type scale tool used to determine the presence and severity of misophonia (Alekri & Al Saif, 2019; Naylor et al., 2021; Schröder et. al, 2013). The A-MISO-S was developed based on the Yale–Brown Obsessive Compulsive Scale and builds off of known characteristics of misophonic experiences and symptoms (Dozier et al., 2017; Naylor et al., 2021). Clinical severity of misophonia using the A-

MISO-S total score is measured as: (0 – 4) subclinical, (5 – 9) mild, (10 – 14) moderate, (15 – 19) severe, and (20 – 24) extreme misophonia (Schröder et al., 2017). The A-MISO-S measures a variety of misophonia symptoms, such as severity of daily impairment and engagement in avoidance behaviors. For example, “How much of your time is occupied by misophonic sounds?” is rated on a scale ranging from 0 “none” to 4 “extreme, greater than 8hrs/day or near constant (thoughts about) sounds”. Both dichotomous and continuous variables were used in the current study. The severity cutoff scores were used to characterize the sample, whereas the continuous variable used to test each hypothesis. See Appendix A for the full A-MISO-S.

The Patient Health Questionnaire-9 (PHQ-9) is a nine-item scale developed based off of the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) items for MDD in order to screen for depression severity, such as “feeling down, depressed or hopeless” in both research and clinical contexts (Kroenke et al., 2001). The PHQ-9 questionnaire is a reliable and validated scale, and has demonstrated particularly strong external validity (Rahman et al., 2022). The recommended clinical cutoff is a score of 10 or higher, indicating moderate to severe depression symptoms (Manea et al., 2012). The ranges of potential depression severity are: minimal (0 – 4), mild (5 – 9), moderate (10 – 14), moderately severe (15 – 19), and severe (20 – 27) (Sun et al., 2020). Although the PHQ-9 is not an effective diagnostic tool for a current depressive episode, it is an effective screening tool for monitoring and detection of severity of depression symptoms (Sun et al., 2020). Similar to the A-MISO-S, both dichotomous and continuous variables were used. The sum score (continuous) was used to examine the hypotheses; whereas the clinical cutoff scores (i.e., dichotomous data) were used to characterize the sample according to the different severity ranges noted above. See Appendix B for the full PHQ-9.

The Work and Social Adjustment Scale (WSAS) is a 5-item scale and was used to determine impact of misophonia on social functioning (Mundt et al., 2002). For example, one item is: “Because of my misophonia my social leisure activities (with other people e.g., parties, bars, clubs, outings, visits, dating, home entertaining) are impaired”. Participants are asked to rate each item on a scale ranging from 0 (not at all) to 8 (very severely). The WSAS measures a distinct factor to the PHQ-9 and GAD-7, impact on social functioning, and has high internal reliability (Zahra et al., 2014). Severity of impact of impairment ranges from subclinical (0 – 10), significant impairment (10 – 20) and severe impairment/psychopathology (20 – 40) (Mundt et al., 2002). In line with previous literature, a cutoff score of 10 or higher was used to determine whether or not significant impairment in social, work, or role functioning was present in participant data. The data from the measure was examined using both cutoff scores and continuous data. The clinical cutoff score was used to characterize the clinical nature of the sample, whereas the sum score was used to test the hypotheses. See Appendix C for the full measure.

Results

Clinical Characteristics

See Table 2 for descriptive statistics for the A-MISO-S, PHQ-9, and WSAS. On the A-MISO-S, the most participants endorsed misophonia symptom severity reported in the moderate range ($n = 29, 43.9\%$), followed by mild ($n = 16, 24.2\%$), severe ($n = 15, 22.7\%$), and subclinical ($n = 2, 3\%$). In terms of clinical cutoff (score ≥ 10), two-thirds of the sample reported clinical severity ($n = 44, 66.7\%$), while the remaining endorsed subclinical levels of severity ($n = 18, 27.3\%$).

On the PHQ-9, 37.9% ($n = 25$) of the participants met the 10-score cutoff recommended for a provisional diagnosis of moderate to severe depressive symptoms (Manea et al., 2012). A majority of participants reported minimal depression severity ($n = 22, 33.3\%$), followed by mild ($n = 18, 27.3\%$), moderate ($n = 16, 24.2\%$), moderately severe ($n = 5, 7.6\%$), and severe ($n = 4, 6.1\%$) depressive symptoms.

In terms of overall impairment in work, social, and role functioning, nearly half of participants reported meeting the clinical cutoff for significant impairment ($n = 31, 47.0\%$) while the remaining participants reported subclinical scores ($n = 29, 43.9\%$), indicating overall low impact of misophonia social, work or role functioning.

Hypothesis Testing

To test the hypothesis that misophonia symptoms would be positively associated with depressive symptoms, bivariate correlational analyses were conducted. Inconsistent with Hypothesis 1, misophonia symptom severity was not significantly correlated with higher depression ($r = 0.219, p = .087$). However, there was significant positive correlation between

misophonia symptoms and impairment ($r = 0.726, p < .01$). Thus, results indicated that higher misophonia symptom severity were not associated with increased depressive symptoms, but were associated with increased misophonia-related impairment in social, work, and role functioning.

To further understand the potential links between misophonia and depression symptoms, additional correlation analyses were conducted to examine the items of the PHQ-9 in relation to the A-MISO-S total score. Analyses revealed that depressed mood ($r = .235, p < .05$), sleep difficulties ($r = .262, p < .05$), eating difficulties ($r = .253, p < .05$), and worthlessness ($r = .272, p < .05$) were associated with higher misophonia scores, indicating that while misophonia severity may not have a direct correlation with overall depression severity, misophonia severity is associated with specific symptoms of depression. See Table 3 for additional details.

In order to test the hypothesis that women would have higher levels of misophonic (AMISO-S, WSAS) and depressive (PHQ-9) symptoms than men, independent samples t-tests were conducted. Contrary to hypotheses, women did not endorse higher symptoms than men. Specifically, there was no significant difference between women ($M = 11.7, SD = 3.7$) and men ($M = 11.6, SD = 2.4; t [60] = .11, p = .915$) on the A-MISO-S. Similarly, women ($M = 11.9, SD = 8.4$) did not have significantly greater misophonia-related impairment than men ($M = 11.0, SD = 3.9; t [58] = .36, p = .723$). Lastly, women ($M = 8.0, SD = 6.3$) did not report significantly higher levels of depressive symptoms than men ($M = 9.3, SD = 5.6, t [63] = .58, p = .562$). See Table 4.

Discussion

The current study sought to examine the relationship between misophonia and depression, and differences in misophonia and depression symptoms between men and women. Misophonia is an emerging disorder, and the relationship between misophonia and other psychological and health disorders has not yet been fully explored (Cassiello-Robbins et al., 2021; Dozier et al., 2017; Erfanian et al., 2018; Erfanian et al., 2019; Rosenthal et al., 2022; Rouw & Erfanian, 2018; Schröder et al., 2013); therefore, it is important to understand the links with misophonia and other disorders. Previous research has demonstrated strong correlations with anxiety-related disorders and MDD (Erfanian et al., 2019; Jager et al., 2020). Similarities in symptoms and behaviors between both misophonia and MDD leads to not only a potential correlation between the two disorders, but also overall increased impairment in social, work, or role functioning (Erfanian et al., 2019; Jager et al., 2020).

Participants in this study were recruited from the Lafayette-Oxford-University and surrounding areas. On average, participants in the current study reported moderate misophonia severity, with symptoms in the clinical range. These symptoms and severity were similar to those observed in an undergraduate sample (Naylor et al., 2021); yet, lower than those reported in a clinical sample (Schröder et al., 2013). On the PHQ-9, participants reported an average score in the minimal to mild depressive range. In addition, approximately 38% of the sample reported clinical levels of depression. The global prevalence rate of MDD is 4.7-9% (McCarter, 2008) and studies examining depression in misophonia samples have found 6.6-7.6% met depression criteria (Rosenthal et al., 2022). Therefore, we observed higher rates of depression in this study. In terms of impairment in work, social, and role functioning, nearly half of the sample reported clinically significant impairment. Prior studies examining impairment in misophonia have

similarly found increased misophonia severity influences increased impairment in work, social and role functioning (Wu et al., 2014).

Analyses were conducted to examine associations between misophonia severity, depression severity and impairment due to misophonia symptoms. There was a significant correlation between misophonia symptoms (A-MISO-S) and impairment due to misophonia (WSAS). This finding is similar to results found in previous studies, as misophonia is known to cause impairment in day-to-day life due to avoidance of trigger sounds and a range of misophonia symptoms (Dozier & Morrison, 2017; Dozier et al., 2017; Naylor et al., 2021; Swedo et al., 2021).

The results did not fully support the first hypothesis that misophonia would have a positive correlation between misophonia symptoms and symptoms of MDD. Previous studies have shown that misophonia has significant correlations with MDD, potentially due to symptom commonalities, similar behaviors, and intrusiveness of misophonic thoughts (Erfanian et al., 2019; Wu et al., 2014). Despite the lack of support for this hypothesis, nearly 40% of the sample endorsed symptoms of depression in the clinical range, suggesting that depression was particularly common in this sample of individuals with misophonia. One possible explanation is that the variability of symptoms in this sample may have been limited and a larger, more diverse sample may be needed to further evaluate this hypothesis. The data ultimately did not support that misophonia and MDD had a positive correlation, contrary to what was predicted and observed in previous literature (Erfanian et al., 2019; Jager et al., 2020).

A more detailed analysis of the data was performed to further examine the relationship between misophonia and depression symptoms. Specifically, the PHQ-9 individual items were analyzed in relation to misophonia symptoms (A-MISO-S) to determine if there are any

relationships between the individual symptoms of depression and misophonia symptoms. Previous literature has shown that misophonia can cause increased irritability, depressed mood, and lack of concentration, which are symptoms of MDD (Erfanian et al., 2019; Wu et al., 2014). The current study reflects these findings as total misophonia severity was significantly correlated with depressed mood, sleeping problems, poor appetite, and decreased confidence in self. While the hypothesis that misophonia and depression would have a positive correlation was not supported by the data, there is evidence that misophonia is related to certain symptoms of depression in participants.

The second hypothesis, predicting that women would experience higher levels of both depression and misophonia severity, was not supported by the data. Previous research has shown that women express higher misophonia symptom severity and women are also at a higher risk of depression; however, the current study did not find higher levels of depression in women (Erfanian et al., 2019; McCarter, 2008). The lack of support for this hypothesis may be attributed to the fact that there were more women than men in this sample. Future research should consider increasing the ratio of women to men in future studies in order to accurately determine whether misophonia and depression severity is higher in women than men.

The current study had several limitations affecting the final results. First, 83% of the final sample ($n = 55$) were female, which prevents the thorough examination of whether or not men experienced different levels of MDD and misophonia severity. Previous literature demonstrates both misophonia and MDD as more common in women; however, examining a more equal sample of gender is essential to overall generalizability of the current findings (Edelstein et al., 2013; Kılıç et al., 2021; McCarter, 2008; Naylor et al., 2021). Second, the final sample size was fairly small ($n = 66$) and a majority of the sample were between ages 18-30 (71.2%) and white

(78.8%). Although the sample is a community sample, these characteristics affect the generalizability of the study, and data from the current study would better depict levels of misophonia and correlations with other psychological disorders in a population of young adult women. Third, this is a cross-sectional study, and it is impossible to determine whether participants reported depressive symptoms due to misophonic experiences, or if participants were experiencing depressive symptoms prior to misophonic symptoms. The current data does not determine whether depression and impairment in social, work and role functioning were influenced by misophonic experiences. As a result, the data cannot confirm whether or not there is a relationship between misophonia and depression and the influence severity of misophonic symptoms has on depression or vice versa.

Future directions for the study include decreasing the gender gap in participants by studying more men to further explore the relationship between gender, depression and misophonia, as well as increasing the age range in order to make the data more generalizable to the U.S. population. A longitudinal study design could be beneficial in determining whether participants experienced depression or misophonia first. By not only working towards participant characteristics that more closely match the current U.S. demographics, but also using a longitudinal study design, future studies can better determine examine the relationship between gender, misophonia and depression.

In sum, the current study sought to examine the relationship between misophonia and depression, as well as the potential role of gender. It was predicted that misophonia and depression would have a positive correlation by examining total scores on the A-MISO-S and PHQ-9; however, data did not fully support this hypothesis. Upon further examination, it was determined that specific symptoms of MDD were positively correlated with misophonia severity.

In addition, it was predicted that women would experience higher levels of misophonia and depression severity than men, though the data did not support this hypothesis. This is attributable to many factors, including the current study including significantly more women than men, the average age of the participants, and lack of a cross-sectional study design. Despite these limitations, this study can be viewed as the beginning steps towards examining the relationship between misophonia and depression, and how gender may influence this relationship.

Implications for future programming regarding misophonia, as well as treatment, vary; however previous literature suggests that cognitive behavioral therapy (CBT) has shown a significant reduction in misophonia severity in 48% of samples (Schröder et al., 2017). Given that misophonia is within the beginning stages of research and understanding, there is not many resources providing information on awareness, prevention, or treatment of misophonia; therefore, programming is needed to develop and disseminate information on misophonia, which may lead to improvements in the detection of individuals with misophonia and connecting them with relevant resources.

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Table 1. *Sociodemographic Information*

	Characteristics	n (%)
Age	<i>M</i>	28.7
	<i>SD</i>	11.9
Sex	Male	11 (18.7)
	Female	55 (83.3)
Race/Ethnicity*	White	52 (78.8)
	African American	9 (13.6)
	Asian	1(1.5)
	Hispanic, Latinx, or Spanish Origin	3 (4.5)
	Middle Eastern or North African	1 (1.5)
	Other/Prefer not to respond	2 (3)
Current Romantic Status	No relationship	19 (28.8)
	Yes, one partner	44 (66.7)
	Yes, multiple partners	3 (4.5)
Sexuality	Straight	47 (71.2)
	Gay or Lesbian	4 (6.1)
	Bisexual	11 (16.7)
	Other	4 (6.1)
Highest Grade or Degree completed	Some High School	1 (1.5)
	High school diploma or equivalent	24 (36.4)
	Vocational training or Technical school	1 (1.5)
	Associate's degree	8 (12.1)
	Bachelor's degree	18 (27.3)
	Master's degree	7 (10.6)
	Applied or Professional doctorate degree	5 (7.6)
Other	2 (3)	
Occupation Status	Unemployed	11 (16.7)
	Employed part-time (1-30 hours/week)	22 (33.3)
	Employed full-time (30+ hours/week)	26 (39.4)
	Other	7 (10.6)
University of Mississippi Enrollment	Not a student	27 (40.9)
	Part-time student (>12 credit hours)	8 (12.1)
	Full-time student (<12 credit hours)	31 (47)

* *Note:* n = 2 participants reported multiple race/ethnicity backgrounds

Table 2. *Pearson Correlations Between Study Variables*

	1	2	3
1. Total A-MISO-S score	—		
2. Total WSAS score	.726**	—	
3. Total PHQ-9 score	.219	.249	—
Mean	11.7*	11.8*	8.2
SD	3.49	7.89	6.18
n	62	60	64

* Indicates clinical significance of impairment and/or severity of symptoms

** Indicates significance at the $p < .01$ level (two-tailed)

Note: A-MISO-S = Amsterdam Misophonia Scale; WSAS = Work and Social Adjustment Scale; PHQ-9 = Patient Health Questionnaire-9

Table 3. *Pearson Correlations between Misophonia Symptoms and PHQ-9 Items*

	Misophonia Symptoms
1. Little interest of pleasure in doing things	.048
2. Feeling down, depressed or hopeless	.253*
3. Trouble falling or staying asleep, or sleeping too much	.262*
4. Feeling tired or having little energy	-.052
5. Poor appetite or over eating	.253*
6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down	.272*
7. Trouble concentrating on things, such as reading the newspaper or watching television	.135
8. Moving or speaking so slowly that other people could have noticed, or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	.170
9. Thoughts that you would be better off dead or of hurting yourself in some way	.016

* Indicates significance at $p < 0.05$ (2-tailed)

Table 4. *Independent samples T-Test of A-MISO-S, WSAS, and PHQ-9*

	Sex	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
A-MISO-S	Male	10	11.60	2.36	0.11	0.915
	Female	52	11.73	3.69		
WSAS	Male	10	11.00	3.91	0.36	0.723
	Female	50	11.98	8.49		
PHQ-9	Male	10	9.30	5.67	0.58	0.562
	Female	55	8.05	6.30		

Note: A-MISO-S = Amsterdam Misophonia Scale; WSAS = Work and Social Adjustment Scale; PHQ-9 = Patient Health Questionnaire-9

Appendix A
Amsterdam Misophonia Scale

Rate the characteristics of each item during the prior week up until and including the time you fill out this survey. Scores should reflect the average (mean) occurrence of each item for the entire week. “Sounds” can mean any misophonic trigger (sound, sign, touch, motion, etc.)

1. **How much of your time is occupied by misophonic sounds?** (How frequently do the (thoughts about the) misophonic sounds occur?)

0	None
1	Mild , less than 1 hr/day, or occasionally (thoughts about) sounds (no more than 5 times per day)
2	Moderate , 1-3 hrs/day, or frequent (thoughts about) sounds (no more than 8 times a day, most of the hours are unaffected)
3	Severe , greater than 3 hours and up to 8 hrs/day or very frequent (thoughts about) sounds
4	Extreme , greater than 8 hrs/day or near constant (thoughts about) sounds

2. **How much do these misophonic sounds interfere with your social, work, or role functioning?** (Is there anything you don’t do because of them? If currently not working determine how much performance would be affected if you were employed.)

0	None
1	Mild , slight interference with social or occupational/school activities, but overall performance not impaired.
2	Moderate , definite interference with social or occupational performance, but still manageable.
3	Severe , causes substantial impairment in social or occupational performance.
4	Extreme , incapacitating.

3. **How much distress do the misophonic sounds cause you?** (In most cases, distress is equated with irritation, anger, anxiety, or disgust. Only rate the emotion that seems triggered by misophonic sounds, not generalized irritation or irritation associated with other conditions.)

0	None
1	Mild , occasional irritation/distress
2	Moderate , disturbing irritation/anger/disgust, but still manageable
3	Severe , very disturbing irritation/anger/disgust
4	Extreme , near constant and disabling anger/disgust.

4. **How much of an effort do you make to resist the (thoughts about the) misophonic sounds?** (How often do you try to disregard or turn your attention away from these sounds? Only rate effort made to resist, not success or failure in actually controlling the thought or sound.)

0	Makes an effort to always resist , or symptoms so minimal don't need to actively resist.
1	Tries to resist most of the time.
2	Makes some effort to resist.
3	Yields to all (thoughts about) misophonic sounds without attempting to control them, but does so with some reluctance.
4	Completely and willingly yields to all obsessions.

5. How much control do you have over your thoughts about the misophonic sounds? How successful are you in stopping or diverting your thinking about the misophonic sounds? Can you dismiss them?

0	Complete control
1	Much control , usually able to stop or divert thoughts about misophonic sounds.
2	Moderate control , sometimes able to stop or divert thoughts about misophonic sounds.
3	Little control , rarely successful in stopping or dismissing thoughts about misophonic sounds, can only divert attention with difficulty.
4	No control , experience thoughts as completely involuntary, rarely able to alter thinking about misophonic sounds.

6. Have you been avoiding doing anything, going any place or being with anyone because of your misophonia? (How much do you avoid, for example, by using other loud sounds, such as music?)

0	No deliberate avoidance.
1	Mild, minimal avoidance. Less than 1hr/day , or occasional avoidance.
2	Moderate, some avoidance. 1 to 3 hr/day and frequent avoidance.
3	Severe, much avoidance. Greater than 3 and up to 8 hr/day. Very frequent avoidance.
4	Extreme, very extensive avoidance. Greater than 8hr/day. Doing almost everything you can to avoid triggering symptoms.

Appendix B
Patient-Health Questionnaire-9

Over the last 2 weeks, how often have you been bothered by any of the following problems? (Use “√” to indicate your answer)	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

**Not difficult
at all**

**Somewhat
difficult**

**Very
difficult**

**Extremely
difficult**

Appendix C
Work and Social Adjustment Scale

People's problems sometimes affect their ability to do certain day-to-day tasks in their lives. To rate your problems, look at each section and determine on the scale provided how much your problem impairs your ability to carry out the activity. This assessment is not intended to be a diagnosis. If you are concerned about your results in any way, please speak with a qualified health professional.

If you're retired or choose not to have a job for reasons unrelated to your problem, tick here

0	1	2	3	4	5	6	7	8
Not at all		Slightly		Definitely		Markedly		Very Severely

1. Because of my misophonia my **ability to work** is impaired. '0' means 'not at all impaired' and '8' means very severely impaired to the point that I can't work.
2. Because of my misophonia my **home management** (cleaning, tidying, shopping, cooking, looking after home or children, paying bills) is impaired.
3. Because of my misophonia my **social leisure activities** (with other people e.g., parties, bars, clubs, outings, visits, dating, home entertaining) are impaired.
4. Because of my misophonia my **private leisure activities** (done alone, such as reading, gardening, collecting, sewing, walking alone) are impaired.
5. Because of my misophonia my ability to form and maintain **close relationships** with others, including those I live with, is impaired.

Total WSAS Score: