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Prevalence, Phenomenology, and Impact of Misophonia in a Nationally Representative Sample of U.S. Adults

Laura J. Dixon[1], Mary J. Schadegg[2], Heather L. Clark[1], Carey J. Sevier[1], and Sara M. Witcraft[3]

[1] Department of Psychology, University of Mississippi

[2] Department of Psychiatry, New York University Grossman School of Medicine, New York University Langone Health

[3] Department of Psychiatry and Behavioral Sciences, College of Medicine, Medical University of South Carolina

Misophonia is characterized by decreased tolerance for and negative reactions to certain sounds and associated stimuli, which contribute to impairment and distress. Research has found that misophonia is common in clinical, college, and online samples; yet, fewer studies have examined rates of misophonia in population-based samples. The current study addresses limitations of prior research by investigating misophonia prevalence, phenomenology, and impairment in a large, nationally representative sample of adults in the United States. Probability-based sampling was used to administer a survey to a representative sample of U.S. households. Data were adjusted with poststratification weights to account for potential sampling biases and examined as weighted proportions to estimate the outcomes. The sample included 4,005 participants (51.5% female; 62.5% White). Sensitivity to misophonia sounds was reported by 78.5% of the sample, and 4.6% reported clinical levels of misophonia. Results demonstrated significant demographic differences in misophonia symptom severity. Specifically, significantly higher misophonia symptoms were observed for participants who identified as female, less than 55 years old, less than a high school education, never married, lower income, and those working part time, compared to each of the respective comparison groups. Those with clinically significant misophonia symptoms reported that symptoms often onset in childhood and adolescence, were persistent, and contributed to severe impairment in at least one life domain. These findings provide a prevalence estimate of misophonia in the general population of the United States and inform our understanding of who is affected by misophonia.

General Scientific Summary

Misophonia affects 4.6% of individuals in the United States. This study found that misophonia symptoms are higher among individuals who identify as female, less than 55 years old, less than a high school education, never married, lower income, and those working part time.

Keywords: misophonia, prevalence, impairment, phenomenology, sound sensitivity

Misophonia is a disorder characterized by decreased tolerance and strong, negative reactions to certain sounds and related stimuli (Jastreboff & Jastreboff, 2001; Swedo et al., 2022). Sounds that trigger misophonia are often human-made, such as eating sounds (e.g., smacking, slurping), nasal and mouth sounds (e.g., breathing, sniffling), repetitive tapping (e.g., typing, pen clicking) and rustling (e.g., plastic bags, paper crickling; Jager et al., 2020). Triggers may also include sounds in the environment, such as a clock ticking or a pet moving (Jager et al., 2020), and visual stimuli associated with sounds (e.g., seeing someone eat from across the room; Swedo et al., 2022). Reactions to misophonic sounds are characterized by intense emotional (e.g., anger, anxiety), behavioral (e.g., mimicking the sound, agitation), cognitive (e.g., negative thoughts, attention), and physiological (e.g., muscle tension, increased heart

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Laura J. Dixon https://orcid.org/0000-0002-9511-2026

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Laura J. Dixon served as lead for conceptualization, formal analysis, funding acquisition, investigation, methodology, project administration, supervision, writing–original draft, and writing–review and editing. Mary J. Schadegg served in a supporting role for conceptualization, writing–original draft, and writing–review and editing. Heather L. Clark served in a supporting role for conceptualization, methodology, writing–original draft, and writing–review and editing. Carey J. Sevier served in a supporting role for writing–original draft. Sara M. Witcraft served in a supporting role for writing–review and editing.

Correspondence concerning this article should be addressed to Laura J. Dixon, Department of Psychology, University of Mississippi, Peabody Hall, P.O. Box 1848, University, MS 38677, United States. Email: ljdixon@olemiss.edu

rate) symptoms (Jager et al., 2020; Rouw & Erfanian, 2018; Swedo et al., 2022). To mitigate these symptoms, individuals often report engaging in numerous behavioral strategies, such as avoiding or escaping from situations, attempting to discontinue the sound, and engaging in coping strategies, such as relaxation techniques and distraction (Rosenthal et al., 2021; Swedo et al., 2022). Misophonia symptoms occur on a continuum of severity (Wu et al., 2014) and can cause severe distress and impairment across life areas (e.g., work, social life; Rouw & Erfanian, 2018; Swedo et al., 2022). Although diagnostic criteria for misophonia have not yet been established, this pattern of symptoms has been found to be distinct from other psychiatric (e.g., obsessive–compulsive disorder, autism spectrum disorder), audiological (e.g., hyperacusis), and medical conditions (e.g., tinnitus; Erfanian et al., 2019; Jager et al., 2020; Rouw & Erfanian, 2018).

As the research on misophonia continues to unfold, one critical area of investigation is the epidemiology of misophonia in the general population. To date, existing studies have often used clinical, college, and online samples to estimate rates of misophonia. In clinical samples, misophonia has been found to affect 8.5%–12.7% of psychiatric patients (Siepsiak, Sobczak, et al., 2020), 35.5% of individuals with autism (Williams et al., 2022), and 10%–57% of patients presenting with tinnitus or other sound sensitivities (Aazh et al., 2022; Jastreboff & Jastreboff, 2002; Sztuka et al., 2010). In these studies, the patient population and the screening tool (e.g., self-report measure and clinical judgment) appear to influence misophonia rates, and selection biases observed in clinical samples limit the extent to which these rates can be translated to other populations (Hegedus & Moody, 2010). In student samples, studies have demonstrated that between 23.1% and 78.9% of individuals have at least some sensitivity to misophonic sounds (Wu et al., 2014; Zhou et al., 2017) and 12.2%–19.9% experience clinical levels of misophonia symptoms based on clinical cutoffs established by the Misophonia Questionnaire (MQ) and the Amsterdam Misophonia Scale (A-MISO-S; i.e., at least moderate symptoms; Naylor et al., 2021; Wu et al., 2014; Zhou et al., 2017). A strength of these college-based studies is the quantification of misophonia symptoms through the use of evidence-based MQs; however, findings are limited by the composition of the sample, which largely includes young, college-enrolled individuals who identify as White and female.

Expanding upon this research, online crowdsourcing platforms have been used to recruit community samples. These samples increase demographic representation by including a greater proportion of male participants, a wider age range, and individuals of varying educational backgrounds. In one study, Guetta et al. (2022) surveyed adults ($N =$ 297, $M_{age} = 39.1$ years, 47.5% female) on Amazon's Mechanical Turk and found that 13.5% of the sample endorsed clinical levels of misophonia on the MQ. Another study recruited participants ($N = 1{,}403$, $M_{age} = 33.3$ years, 51.1% female) from Prolific to validate the Duke-Vanderbilt Misophonia Screening Questionnaire (Williams et al., 2022). In this sample, the prevalence rate of misophonia was 7.3%. Although the samples of these two studies were similar, each study used different clinical criteria and assessments of misophonia, which may account for the discrepancy in prevalence rates. Building upon this work, Vitoratou et al. (2023) took additional steps to approximate a representative sample by conducting stratified sampling to select individuals representative of the general U.K. population based on sex, age, and ethnicity. Participants ($N = 772$, $M_{age} = 46.4$ years, 51.3% female) were recruited from Prolific and completed self-report questionnaires and a misophonia diagnostic interview. Clinical levels of misophonia were observed in 18.4% of the sample based on the S-Five (Vitoratou et al., 2021). This study has many strengths, including the use of a receiver operating characteristic (ROC) analysis to identify clinical levels of misophonia, the concurrent use of a diagnostic interview and questionnaires, and using sampling quotas to approximate the U.K. population on certain demographic features; however, the sampling procedures limit population-level inferences. Cumulatively, these findings add to our understanding of the rates of misophonia in different samples; yet, the methodology relied on nonrandom selection, nonprobability sampling, and convenience samples. To determine prevalence rates and understand the experience of misophonia in the broader population, studies using random sampling procedures to recruit nationally representative samples are necessary.

To date, two studies have conducted random sampling to estimate rates of misophonia in Ankara, Turkey (Kılıç et al., 2021) and Germany (Jakubovski et al., 2022). In the first study, individuals ($N = 541$; $M_{age} = 43.5$ years, 58.0% female) in Turkey's capital city, Ankara, were identified using bus stops as the sampling frame (Kılıç et al., 2021). Although the sample is described as nationally representative, the demographic parameters represented by this sample are not reported. A semistructured misophonia interview developed for this study was administered, and results indicated that 12.8% of individuals met the criteria established by the authors. In the second study, a randomized sampling procedure was used to identified 53,000 areas in Germany, and a target individual was selected using the Kish grid method from each of 23 households in each area that were identified on a random route (Jakubovski et al., 2022). Jakubovski et al. (2022) reported their randomly selected sample was comparable to the general population in Germany in terms of household size, age distribution (men/women), and geographic region. Participants ($N = 2{,}519$; $M_{age} =$ 50.3 years, 52.5% female) completed a paper–pencil battery of self-report questionnaires, which included the MQ and the Amsterdam Misophonia Scale—Revised. Clinical misophonia symptoms were identified in 5.0% of the sample on the Misophonia Questionnaire Severity Scale and 5.9% of the sample on the Amsterdam Misophonia Scale—Revised, with only 2.2% meeting both criterions. Together, these studies provide population-level estimates of the rates of misophonia and address many of the limitations inherent to clinical, student, and online samples; nevertheless, continued research is necessary to further establish broader population norms.

The purpose of the current study was to conduct a rigorous investigation of misophonia prevalence, phenomenology, and impairment by using probability-based sampling to survey a large, nationally representative sample of U.S. adults. This study was developed prior to recent developments in the assessment of misophonia (e.g., Rosenthal et al., 2021; Vitoratou et al., 2021; Williams et al., 2022); however, the combination of the MQ and the A-MISO-S were used to provide a more complete assessment and identification of misophonia cases. The first aim was to characterize misophonia sound triggers, emotional and behavioral responses, and clinical levels of misophonia symptoms within this sample. The second aim was to examine demographic predictors of misophonia symptom severity. The last aim was to describe demographic characteristics, history of misophonia symptoms (e.g., age of onset, progression of symptoms, family history), and impairment among individuals reporting clinically significant levels of misophonia. Given the

aims of the study and the exploratory nature of this work, there were no hypotheses.

Method

Sampling and Data Collection Procedures

Data were collected by Ipsos KnowledgePanel (KnowledgePanel), which maintains the largest, web-based panel that is designed to be representative of the U.S. population. KnowledgePanel (formerly Knowledge Networks, Inc.) has been used in epidemiological research, including national health organizations (e.g., Centers for Disease Control and Prevention, 2010), to estimate the base rates and impact of a range of conditions in the general population, such as food allergy (Gupta et al., 2011), chronic pain (Johannes et al., 2010), atopic dermatitis (Silverberg et al., 2018), and chronic illness (Rosland et al., 2013). KnowledgePanel uses probability-based sampling methods, specifically address-based sampling methodology, to recruit members based on the latest delivery sequence file from the U.S. Postal Service and to select samples that are nationally representative of all households (Ipsos Public Affairs, n.d.). This recruitment methodology reduces self-selection bias and facilitates the recruitment of a nationally representative sample, including commonly underrepresented and hard-to-reach individuals. For instance, the address-based sampling includes representation of households that do not have Internet access, and KnowledgePanel provides a web-enabled device to individuals who do not have access to the internet. To further ensure that samples are representative of the U.S. population, study-specific poststratification weights are applied to survey data based on geodemographic benchmarks from the latest U.S. Census Bureau's Current Population Survey. The benchmarks used to weight the active panel members include gender, age, race/ethnicity, education, household income, census region, home ownership status, metropolitan area, and Hispanic origin. This weighting process addresses potential under- or oversampling of certain subgroups, and an iterative proportional fitting is used to produce the final weights. Information collected using such representative sampling methods has previously allowed other research institutions (e.g., Centers for Disease Control and Prevention) to draw population-based conclusions, and subsequently, we estimate that these results are similarly informative.

Participation in each KnowledgePanel survey is voluntary, and consent is implicit in the completion and return of the survey. Panel members typically do not receive more than one invitation per week, and a modest incentive program is used by KnowledgePanel to encourage ongoing participation. KnowledgePanel survey completion is typically about 60%, which is a substantially higher rate than nonprobability online panels that yield completion rates in the single digits (Ipsos Public Affairs, n.d.).

Based on studies indicating the dimensional nature of misophonia symptoms and estimating that between 6%–20% of individuals recruited from nonpatient samples report clinically significant misophonia symptoms (Wu et al., 2014; Zhou et al., 2017), it was determined that 4,000 completed surveys would yield a sufficient sample to conduct descriptive statistics, group comparisons, and exploratory analyses. A pretest of the survey was conducted in January 2022, and the main survey was administered between January 21, 2022 and February 6, 2022. Selected panel members ($N = 6{,}688$) received an email invitation to complete an online survey and were asked to do so at their earliest convenience. Email reminders were sent to nonresponders on the third day of the survey period, and additional reminders were sent to any remaining nonresponders on Days 7 and 11 of the survey period. The response rate for this survey was 59.9%.

Participants

The sample included 4,005 adults between the ages of 18–93 years ($M_{age} = 48.32$; $SD = 17.76$). Approximately half the sample was female (51.5%), and identified as White, non-Hispanic (62.5%); Hispanic (16.9%); Black, non-Hispanic (12.0%); Other, non-Hispanic (7.2%); and multiracial, non-Hispanic (1.4%). In terms of education, 9.6% did not have a high school degree, 28.3% had a high school degree or General Education Development diploma, 27.1% had some college education, and 35.0% had a Bachelor's degree or higher. With regard to marital status, over half the sample was married (56.6%), 29.5% never married, 9.4% divorced or separated, and 4.5% widowed. Annual household income was fairly evenly distributed and ranged from >$10,000 to $150,000 or more. With regard to current employment status, 48.8% worked full time, 13.0% worked part time, and 38.1% were not working. Most of the sample (86.7%) reported being from a metropolitan area. Altogether, this sample reflects the U.S. population based on the March 2021 supplement of the U.S. Census Bureau's Current Population Survey.

Measures

Demographic Characteristics and Misophonia Symptom History

Demographic characteristics were assessed by KnowledgePanel. Gender, age, age group, race/ethnicity, education, marital status, household income, employment status, and metropolitan area status (i.e., area with ≥one urbanized area of 50,000 or more population as defined by the U.S. Census) are reported. Five misophonia symptom history questions were used to assess age of onset, first sound trigger, changes in the intensity and number of sound triggers, and biological familial history of sound sensitivities. Each item included multiple response options, and participants could endorse multiple responses for the items assessing first sound trigger and familial history of sound sensitivities. In addition, three questions assessed the characteristic symptom of other sensory experiences. Specifically, participants responded yes/no to the following questions: (a) "Do you have ringing, buzzing, humming or other noises in your ear (tinnitus)?"; (b) "are every day sounds too loud for you?" (hyperacusis); and (c) "autonomous sensory meridian response (ASMR) describes an atypical multisensory experience of calming, tingling sensations that originate in the crown of the head in response to a specific subset of audio-visual triggers. Do you experience ASMR?"

Misophonia Symptoms

The A-MISO-S (Schröder et al., 2013) is a six-item measure adapted from the Yale-Brown Obsessive Compulsive Scale (Goodman et al., 1989). Items evaluate the time occupied by misophonic sounds, social functioning, distress, effort to resist thoughts about the misophonic sounds, control over thoughts about the misophonic sounds, and avoidance of misophonic sounds. Each item is rated on scale from 0 (*none*) to 4 (*extreme*). The items are summed to compute the A-MISO-S total score, and scores correspond to

severity ranges, indicating subclinical misophonia symptoms (0–4), mild symptoms (5–9), moderate symptoms (10–14), severe symptoms (15–29), or extreme symptoms (20–24). Previous research has used a clinical cutoff of ≥10 to identify individuals with misophonia (Naylor et al., 2021; Schröder et al., 2013), which has been found to detect misophonia-related functional impairment with 89% sensitivity and 67% specificity (Möllmann et al., 2023). In this study, the A-MISO-S was used as a measure of misophonia symptom severity and to characterize clinical levels of misophonia. In the full sample, the internal consistency of the A-MISO-S was good ($\alpha = .88$).

The MQ (Wu et al., 2014) is a 20-item self-report questionnaire that assesses misophonia symptom prevalence (Symptom Scale), emotions and behaviors related to misophonia (Emotions and Behavior Scale), and overall severity of sound sensitivities (Severity Scale). The Symptom Scale includes seven primary items that assess the presence of specific sound sensitives, such as eating, nasal and throat sounds, and repetitive tapping sounds. Items are rated on a Likert-type scale from 0 (*not at all true*) to 4 (*always true*). The Emotions and Behavior Scale consists of ten primary items that evaluate reactions to misophonia sounds, such as avoidance of situations, annoyance, and verbal aggression. Items are rated on a Likert-type scale ranging from 0 (*never*) to 4 (*always*). The last item of both scales includes an "other" option that allows participants to identify an additional symptom; however, this item is not included in the total score. The Severity Scale includes one item that evaluates overall symptom severity on a scale from 1 (*minimal*) to 15 (*very severe*). Scores ≥ 7 indicate significant interference caused by clinically significant symptoms (Wu et al., 2014). Möllmann et al. (2023) found this cutoff score was the optimal balance for detecting misophonia-related impairment with 78% sensitivity and 77% specificity. In this study, the MQ was used to characterize misophonia symptoms in the sample, and the MQ Severity Scale was used as a clinical criterion. Good internal consistency was observed for the MQ Symptom Scale ($\alpha = .87$) and MQ Emotions and Behavior Scale ($\alpha = .87$).

Impairment

The Work and Social Adjustment Scale (WSAS; Mundt et al., 2002) is a five-item scale scored on a Likert-type scale from 0 (*not at all*) to 8 (*very severely*). Participants were asked to consider how their misophonia affects their ability to carry out certain tasks across five key areas including work, home management, social leisure activities, private leisure activities, and ability to maintain close relationships. Scores range from 0 to 40, and scores ≥ 20 indicate clinical levels of functional impairment, scores between 10 and 20 indicate significant impairment, and scores less than 10 are indicative of subclinical symptoms (Mundt et al., 2002). In this study, the WSAS was only administered to individuals who endorsed symptoms on the MQ Symptom Scale or the A-MISO-S ($n = 3{,}787$). Good internal consistency was observed ($\alpha = .90$) in this sample.

Data Analyses

Analyses were conducted with SPSS Version 28.0. KnowledgePanel sample weights were applied for all analyses. Data were initially screened and assumptions for Little's Missing Completely at Random Test were met for items not included in the questionnaire's skip logic ($p > .05$), suggesting data were missing at random. To maximize cases included, mean imputation was used to compute total scores for measures where <20% of items on the scale were missing. First, descriptive analyses were conducted to characterize misophonia symptoms (MQ Symptoms, MQ Emotions and Behaviors Scale, MQ Severity Scale, and A-MISO-S) in the full sample. Second, a series of independent samples *t* tests and analyses of variance (ANOVAs) were conducted to examine each demographic factor as a predictor of misophonia symptom severity (A-MISO-S). Given the exploratory nature of these analyses, equal variances were not assumed. Games-Howell post hoc tests were conducted to compare all group differences for each demographic factor. Alpha was set at .01.

Finally, characteristics of individuals with clinically significant misophonia symptoms were examined. Consistent with Jakubovski et al. (2022), two criterion were used to identify clinical levels of misophonia. Specifically, participants who scored in the clinical range on the A-MISO-S (total scores ≥ 10; Möllmann et al., 2023; Schröder et al., 2013) and the MQ Severity Scale (scores ≥ 7; Möllmann et al., 2023; Wu et al., 2014) were identified as having misophonia. Descriptive analyses were used to examine demographic characteristics, misophonia symptom history, and impairment due to misophonia symptoms (WSAS) among those with misophonia.

This study was not preregistered. However, the data, syntax, and output are available (Dixon, 2024a, 2024b), and study materials are available upon request from the corresponding author.

Results

Misophonia Symptoms in the Full Sample

The means, standard deviations, and frequencies of endorsing misophonia sounds, emotions, and behaviors are reported in Table 1. A total of 78.5% of individuals reported being at least "sometimes" sensitive to one sound or more ($M = 3.15$, $SD = 2.30$) on the MQ Symptom Scale. On average, the sound of people eating received the highest endorsement, whereas the sound of certain consonants and/or vowels was the least endorsed. On the MQ Emotions and Behavior Scale, 67.9% reported at least "sometimes" experiencing one or more behavioral and emotional symptom associated with misophonia. Among individuals who endorsed sensitivity to misophonic sounds, the most common emotional and behavioral responses endorsed were becoming annoyed and leaving the environment (respectively).

Next, indicators of clinically significant misophonia symptoms were examined. Participants generally reported a mild level of sound sensitivity severity on the MQ Severity Scale ($M = 4.00$, $SD = 3.21$) and 14.3% scored in the clinical range. Similarly, the average score on the A-MISO-S was in the subclinical range ($M = 3.66$, $SD = 3.63$), and most participants reported subclinical levels of misophonia severity (65.0%), 25.9% endorsed mild symptoms, 7.2% moderate, 1.0% severe, and 0.1% extreme symptoms. Altogether, 8.3% participants met the threshold for clinically significant levels of misophonia severity on the A-MISO-S. A total of 185 (4.6%) participants met the misophonia criteria for this study by scoring in the clinical range on the MQ Severity Scale and the A-MISO-S.

Examination of Demographic Predictors of Misophonia Symptom Severity

Table 2 provides a summary of group means, standard deviations, and results of the *t* tests and ANOVAs with post hoc Games-Howell

Table 1
Endorsement of Misophonia Sounds, Emotions, and Behaviors in Full Sample

MQ item	*M*	*SD*	Frequency of endorsement (%)					
			0	1	2	3	4	Refused
MQ sounds	9.71	6.01						
People eating[a]	1.82	1.25	19.0	21.0	29.8	18.7	11.0	0.6
Repetitive tapping[a]	1.71	1.20	19.7	23.1	31.1	17.2	8.2	0.6
Rustling[a]	1.18	1.10	34.0	28.6	24.4	8.9	3.3	0.8
Nasal sounds[a]	1.56	1.16	22.4	25.1	31.3	14.6	5.9	0.8
Throat sounds[a]	1.60	1.18	22.3	23.3	31.8	15.3	6.4	0.9
Consonants and/or vowels[a]	0.63	0.92	59.7	22.4	12.7	3.4	1.2	0.6
Environmental sounds[a]	1.21	1.13	34.1	27.8	23.8	10.0	3.6	0.7
MQ emotions and behaviors	8.61	6.07						
Leave environment[b]	1.45	1.01	20.8	28.2	37.4	11.0	2.0	0.5
Actively avoid[b]	1.10	1.04	36.0	28.6	25.7	7.6	1.8	0.3
Cover ears[b]	0.70	0.88	53.4	26.8	16.0	2.8	0.6	0.4
Become anxious or distressed[b]	1.00	1.05	40.9	28.9	20.9	6.6	2.3	0.4
Become sad or depressed[b]	0.44	0.76	69.4	19.5	8.3	2.0	0.4	0.4
Become annoyed[b]	1.84	1.01	9.4	26.6	39.9	17.9	5.7	0.5
Have violent thoughts[b]	0.37	0.73	73.7	17.0	6.7	1.5	0.6	0.5
Become angry[b]	0.93	0.96	40.2	33.3	19.9	4.9	1.3	0.4
Become physically aggressive[b]	0.23	0.56	82.4	12.8	3.7	0.6	0.2	0.4
Become verbally aggressive[b]	0.54	0.79	61.4	25.0	10.9	1.7	0.5	0.5

Note. Weighted data are reported. MQ = Misophonia Questionnaire (Wu et al., 2014); refused = no response provided or refused.
[a] $N = 4{,}005$. [b] $N = 3{,}680$; only participants who endorsed sensitivity to a sound on the MQ Symptom Scale responded to these items.

tests. As shown, females reported significantly higher misophonia symptoms compared to males. The analyses also revealed significant omnibus tests for age, race/ethnicity, education, marital status, household income, and employment. Post hoc Games-Howell tests identified that misophonia symptoms were higher in younger age groups (Groups 18–24, 25–34, 35–44, and 45–54) compared to older age groups (Groups 55–64, 65–74, and 75+), those with less than a high school education (vs. high school, some college, and a Bachelor's degree or higher), individuals who had never been married (vs. married, widowed, and divorced/separated), and individuals working part time (vs. working full time or not working). With regard to household income, higher scores were generally associated with lower income, and specifically, individuals with a household income less than $10,000 and those with a household income of $25,000–$49,999 each had significantly higher misophonia symptoms than those with an income greater than $150,000, and individuals with a household income between $10,000 and $24,999 had significantly higher misophonia symptoms than groups of individuals with a household income of $50,000 or higher. Although a significant omnibus test was found for race/ethnicity, no significant between-group differences were identified in post hoc comparisons. In addition, no significant differences were observed with regard to metropolitan area status.

Characteristics of Participants With Clinically Significant Misophonia Symptoms

Demographic characteristics (see Table 3) and misophonia symptom history responses (see Table 4) of individuals with clinical levels of misophonia were examined. In sum, misophonia symptoms were found to commonly emerge in childhood and adolescence, and close to half of individuals in each misophonia group identified the sound of people eating as their first significant sound trigger. In addition, the majority of participants reported the number of sound triggers and intensity of sound triggers increased or had not changed since first experiencing the sensitivities. With regard to family history, 28.2% of participants identified at least one family member with sound sensitivities (mode = 1; range = 0–6), and the most frequently identified relative was a parent. Last, a portion of participants endorsed other sensory sensitivities, with tinnitus being the most common (44.1%).

Impairment Among Participants With Clinically Significant Misophonia Symptoms

With regard to impairment due to misophonia symptoms (WSAS; $M = 14.81$, $SD = 8.32$), 26.1% endorsed clinical levels of impairment, 34.9% reported significant impairment, 38.0% reported subclinical levels of impairment, and 1.0% did not respond to items. To better understand domains of impairment observed among individuals with misophonia, percentages were calculated for individuals reporting "definite" impairment or higher (i.e., ≥ 4) in each of the areas. Using this threshold, 68.9% of individuals reported substantial impairment in at least one life area. Impairment in social leisure activities was the most common area of impairment (49.8%), followed by in home management (33.0%), work (32.3%), ability to form and maintain close relationships with others (31.0%), and private leisure activities (30.8%).

Discussion

This study is the first to examine misophonia symptoms in a large, nationally representative sample of U.S. adults. The descriptive data and analyses predicting misophonia symptom severity inform our understanding of who is affected by misophonia in the general

Table 2
Results of Analyses Examining Demographic Predictors of Misophonia Symptom Severity

		Misophonia symptom severity			
Predictor	*M* (*SD*)	Test statistic	*p*	Effect	Significant comparisons
Gender[a]		$t(3978) = 5.55$	<.001	$d = 0.176$	
Male	3.33 (3.56)				
Female	3.97 (3.68)				
Age		$F(6, 4436) = 25.92$	<.001	$\eta^2 = .034$	a, b, c, d > e, f, g
18–24	4.12 (3.72)[a]				
25–34	4.32 (3.97)[b]				
35–44	4.12 (3.88)[c]				
45–54	3.89 (3.63)[d]				
55–64	3.15 (3.19)[e]				
65–74	2.72 (2.78)[f]				
75+	2.63 (3.08)[g]				
Race/ethnicity		$F(4, 4438) = 4.22$	.002	$\eta^2 = .004$	—
White, non-Hispanic	3.49 (3.44)				
Black, non-Hispanic	3.41 (3.58)				
Other, non-Hispanic	3.78 (3.55)				
Hispanic	3.86 (3.90)				
2+ races, non-Hispanic	5.47 (4.18)				
Education		$F(3, 4439) = 7.57$	<.001	$\eta^2 = .005$	a > b, c, d
<High school	4.41 (4.17)[a]				
High school	3.49 (3.75)[b]				
Some college	3.46 (3.48)[c]				
≥Bachelor's degree	3.52 (3.25)[d]				
Marital status		$F(3, 4439) = 29.03$	<.001	$\eta^2 = .019$	a, b, c < d
Married	3.24 (3.24)[a]				
Widowed	3.04 (3.53)[b]				
Divorced/separated	3.60 (3.53)[c]				
Never married	4.34 (4.02)[d]				
Household income		$F(6, 4436) = 11.34$	<.001	$\eta^2 = .015$	a, b, c > g; b > d, e, f
>$10,000	4.57 (4.69)[a]				
$10,000–$24,999	4.54 (4.37)[b]				
$25,000–$49,999	3.91 (3.68)[c]				
$50,000–$74,999	3.40 (3.28)[d]				
$75,000–$99,999	3.40 (3.35)[e]				
$100,000–$149,999	3.38 (3.34)[f]				
≥$150,000	3.17 (3.21)[g]				
Employment		$F(2, 4443) = 8.60$	<.001	$\eta^2 = .004$	a, c < b
Working full time	3.56 (3.39)[a]				
Working part time	4.11 (3.75)[b]				
Not working	3.40 (3.63)[c]				
Metropolitan area		$t(690) = 0.36$	.716	$d = 0.017$	
Nonmetro	3.72 (3.74)				
Metro	3.65 (3.62)				

Note. Misophonia symptom severity was measured using the A-MISO-S. Degrees of freedom are adjusted based on sample weights. A-MISO-S = Amsterdam Misophonia Scale. Significant comparisons at $p < .01$.

population, and the use of widely used MQs helps to further contextualize existing and future research in this area.

Consistent with previous findings (Wu et al., 2014; Zhou et al., 2017), many individuals within the general population experience at least some sensitivity to misophonic sounds, and eating sounds and repetitive tapping were the most common sounds reported. The primary findings suggest that 4.6% of individuals in the U.S. experience clinical levels of misophonia symptoms. This rate is most consistent with the findings observed in Germany (Jakubovski et al., 2022); yet, is lower than previous estimates of misophonia in college (Naylor et al., 2021; Wu et al., 2014; Zhou et al., 2017), online (Guetta et al., 2022; Vitoratou et al., 2023; Williams et al., 2022), and population-based (Kılıç et al., 2021) samples. This discrepancy is likely due to differences in measurement and biases in sampling.

With regard to measurement, the current study and Jakubovski et al. (2022) found similar misophonia rates and both used two misophonia measures to establish clinically significant misophonia, wherein one of the clinical indicators was the MQ Severity Scale and the other measure was a variant of the A-MISO-S. The use of both measures appears to result in a more stringent evaluation of misophonia-related distress and functional impairment; however, future work is needed to determine the specificity and sensitivity of concurrently using both measures to detect clinical levels of misophonia. In contrast, the use of one clinical criterion has yielded higher prevalence rates, ranging from 7.3% to 18.8% in online samples (Guetta et al., 2022; Vitoratou et al., 2023; Williams et al., 2022) and 5.0% to 12.8% in population-based samples (current results; Jakubovski et al., 2022; Kılıç et al., 2021). This pattern of findings underscores the need to further refine the assessment of clinical

Table 3
Demographic Characteristics of Participants With Clinically Significant Misophonia Symptoms (n = 185)

Demographic characteristic	Weighted %
Gender	
Male	46.6
Female	53.4
Age	
18–24	10.9
25–34	33.9
35–44	20.1
45–54	13.9
55–64	12.9
65–65	4.1
75+	4.1
Race/ethnicity	
White, non-Hispanic	62.4
Black, non-Hispanic	11.0
Other, non-Hispanic	5.9
Hispanic	18.9
2+ races, non-Hispanic	1.8
Education	
No high school diploma or GED diploma	16.2
High school graduate or equivalent	31.2
Some college	24.6
Bachelor's degree or higher	28.0
Marital status	
Married	43.9
Widowed	4.1
Divorced/separated	7.1
Never married	45.0
Household income	
>$10,000	8.2
$10,000–$24,999	20.3
$25,000–$49,999	17.9
$50,000–$74,999	12.7
$75,000–$99,999	11.8
$100,000–$149,999	13.1
$150,000 or more	16.0
Employment	
Working full time	42.1
Working part time	16.1
Not working	41.8
Metropolitan area	
Nonmetro	16.7
Metro	83.3

Note. GED = General Educational Development.

Table 4
Misophonia Symptom History (n = 185)

Misophonia history	Weighted %
Age of onset	
0–5	6.1
6–10	10.3
11–15	14.8
16–20	22.6
21–25	10.5
26–30	8.3
31–35	5.9
36–40	3.9
41–45	1.9
46–50	3.9
51–55	2.1
56–60	0.7
61+	0.0
Do not know/remember	9.0
First sound trigger(s)[a]	
People eating	56.9
Environmental sounds	44.1
Repetitive tapping	43.9
Throat sounds	40.7
Nasal sounds	36.7
Rustling	29.0
Certain consonants and/or vowels	11.6
Do not know/remember	6.7
Refused/missing	1.2
Sound triggers changed in number	
Significantly decreased	0.4
Somewhat decreased	13.1
Have not changed	38.6
Somewhat increased	28.7
Significantly increased	18.3
Refused/missing	0.9
Sound triggers changed in intensity	
Significantly decreased	1.2
Somewhat decreased	9.5
Have not changed	40.4
Somewhat increased	36.7
Significantly increased	11.6
Refused/missing	0.7
Biological family member(s)[a]	28.2
Parent	18.0
Sibling	12.0
Child	4.7
Grandparent	5.0
Aunt/uncle	3.1
None	17.4
Do not know	53.9
Refused/missing	0.5
Other sensory sensitivity	
Ringing, buzzing, humming, or other noises in your ear (tinnitus)	44.1
Every day sounds too loud	41.6
ASMR	20.2

Note. ASMR = autonomous sensory meridian response.
[a] Individuals were able to select multiple responses.

criterion for misophonia and for researchers to carefully consider how clinical levels of misophonia are identified. Although diagnostic criteria have not been established, recent work established a consensus definition for misophonia that should be used to inform future research in this area (Swedo et al., 2022). For example, the recently developed Duke-Vanderbilt Misophonia Screening Questionnaire uses a diagnostic algorithm to evaluate clinical criterion that align with the consensus definition (Williams et al., 2022); hence, future studies should consider the use of this questionnaire or other questionnaires that would similarly capture this information.

The variability in rates of misophonia is also likely due to the differences in sampling and sampling bias. For instance, several studies suggest younger age is associated with misophonia (Kılıç et al., 2021; Vitoratou et al., 2023; Williams et al., 2022); therefore, misophonia may be overrepresented in college samples. In addition, self-selection biases may overestimate rates of misophonia observed in clinical samples and online studies. To overcome such biases, the current study used stratified random sampling of all known households and extraordinary steps were taken to reduce sampling bias (e.g., supplying individuals with an internet-enabled device if needed). Further, sampling weights were used to ensure the sample represented the U.S. population across many sociodemographic characteristics (i.e., gender, age, race/Hispanic ethnicity, education, census region, household income, home ownership status, metropolitan area, and Hispanic

origin). Thus, we can be reasonably sure that the results represent the actual rate of misophonia in the U.S. population. To date, only two studies have used random sampling to select individuals from Germany and Ankara, Turkey. Beyond differences in measurement, comparisons across these studies are difficult to make given the potential for cultural differences and discrepancies in the reporting of demographic information. Additional research using random selection and nationally representative samples is necessary to estimate the global prevalence of misophonia.

Next, analyses were conducted to identify subpopulations that may be disproportionately affected by misophonia symptoms. Small effects were found, wherein significantly higher misophonia symptoms were observed for those who identified as female, less than 55 years old, less than a high school education, never married, lower income, and part-time employment status, compared to each of the respective comparison groups. These findings add to the growing body of research examining demographic predictors of misophonia. Consistent with the current findings, some studies have found misophonia symptoms to be more common among women (Kılıç et al., 2021; Williams et al., 2022), younger individuals (Kılıç et al., 2021; Vitoratou et al., 2023; Williams et al., 2022), and individuals who are not married (Kılıç et al., 2021); yet, the population-based study conducted in Germany did not find significant effects for these factors (Jakubovski et al., 2022). Interesting, a higher rate of high school degrees and living in rural areas were the only significant demographic characteristics to predict misophonia in Germany (Jakubovski et al., 2022), which is inconsistent our findings that showed a significant effect of lower education and no effect of metropolitan status on misophonia symptom severity. In addition, the present study is the first to show that lower income and working part-time were each associated with significantly higher misophonia symptoms. Although replication of these findings is necessary, this pattern of results is generally consistent with research showing that lower education, lower income, and job insecurity are associated with worse health outcomes and less access to health care (World Health Organization (WHO), n.d.), which suggests the need to further consider how to detect and treat misophonia among individuals who may be underserved. Finally, although our results did not reveal significant between group differences for the effect of race/Hispanic ethnicity, a significant omnibus effect was observed, suggesting the need for continued research in this area.

In addition to the primary findings, the misophonia history symptoms results lend further support to findings observed in previous misophonia samples (e.g., Jager et al., 2020; Rouw & Erfanian, 2018). Specifically, misophonia symptoms were found to start in childhood and adolescence, and eating sounds were most frequently reported as the first sound trigger. Repetitive tapping, environmental sounds, and throat sounds were also identified by many as a first sound trigger. Most individuals reported that the severity of these symptoms did not change or worsened over time, which suggests that misophonia symptoms are often chronic and may be progressive. Regarding family history, most individuals reported that they did not know of a family member with sound sensitivities; however, about one-quarter of participants identified at least one family member experienced sound sensitivities, with a parent being the most frequently identified member. Prior studies have reported that between 22%–43.5% of individuals with misophonia indicated knowing a family member with similar symptoms (Kılıç et al., 2021; Rouw & Erfanian, 2018); however, there is very little research in this area, and additional studies are needed to further understand the potential biological and environmental influences of the development of misophonia.

Regarding other sensory sensitivities, 41.6% of the misophonia sample endorsed that they experienced everyday sounds as too loud, which is much higher than hyperacusis rates observed in previous studies (e.g., 0.7%–1.9%; Jager et al., 2020; Möllmann et al., 2023), suggesting that the high rate observed in this study is likely an overestimation due to measurement rather than the true rate of co-occurrence of this disorder. Conversely, the rates of tinnitus and ASMR were generally consistent with the range of rates reported by previous studies, which have shown 13.8%–50.4% of individuals with misophonia experience ASMR (Jakubovski et al., 2022; Möllmann et al., 2023; Rouw & Erfanian, 2018) and 1.7%–43.5% experience tinnitus (Jager et al., 2020; Kılıç et al., 2021; Möllmann et al., 2023).

Finally, with regard to impairment, a large portion of the sample endorsed significant or clinical levels of overall impairment, and most of the sample reported substantial impairment in at least one life area. In particular, impairment in social activities with others was the most frequently endorsed area of concern. These findings replicate previous studies showing that individuals with misophonia often make significant adjustments to their life, experience an overall lower quality of life, and have lost jobs or relationships due to their symptoms (Jager et al., 2020; Wu et al., 2014; Zhou et al., 2017).

Although this study addresses gaps in the literature and has many strengths, including the use of a random sampling to recruit a nationally representative sample, several limitations should be considered in future research. First, diagnostic criteria for misophonia have not yet been established; therefore, heightened levels of distress and impairment have typically been used to detect clinical levels of misophonia in the current and existing studies. The measures used in this study were prominent in the literature at the time of the current study; however, these measures were developed in the early stages of misophonia research when very little empirical data were available on the symptom presentation of misophonia and a consensus definition of misophonia was not available (Swedo et al., 2022). This study used both the MQ Severity scale and the A-MISO-S in attempt to overcome the limitations of each of the respective measures; however, in context of the current literature, there are notable issues with each of these measures. For instance, the A-MISO-S was initially developed based on the YBOCS and did not originate for the explicit purpose of measuring misophonia symptoms. With regard to the MQ, only one item is used to evaluate clinical severity, and the instructions for this item ask about impairment related to sound sensitivity rather than specifically referencing misophonia. Therefore, responses to this item may reflect one's experience of sound sensitivity more broadly and may not be specific to misophonia. Recent advancements in misophonia research have yielded a number of self-report measures that were developed based on misophonia research and demonstrate strong psychometric properties, such as the S-Five (Vitoratou et al., 2021, 2023), Duke Misophonia Questionnaire (Rosenthal et al., 2021), Misophonia Response Scale (Dibb et al., 2021), Duke-Vanderbilt Misophonia Screening Questionnaire (Williams et al., 2022), and MisoQuest (Siepsiak, Sliwerski, et al., 2020). To advance this research, researchers should carefully select science-based measures of misophonia. Replication of the current findings is needed in the future, particularly when misophonia diagnostic criteria and a brief

screening measure with sensitivity and specificity for detecting these criteria have been established.

A second limitation is that this study used one item to evaluate the presence of the characteristic symptom of other sensory sensitivities (i.e., hyperacusis, tinnitus, and ASMR); however, the items are not diagnostic tools, and these data should be interpreted with caution. Future work is needed to more thoroughly evaluate the presence of other sensory sensitivities and mental health disorders and attempt to disentangle misophonia symptoms and impairment from other conditions. Third, participants were asked to retrospectively recall history of misophonia symptoms and may not accurately recall their first sound trigger or the change in number and intensity of triggers. In addition, few items were used to assess this information. The literature on the development of misophonia is limited; therefore, future studies may consider integrating the use of a qualitative interview, in-person behavioral assessments, or the integration of a family member's report of symptoms to further understand historical features associated with misophonia symptoms. Last, the study used a representative sample of U.S. adults; however, the findings may not generalize to other countries. Continued research in this area is necessary to understand the worldwide prevalence of misophonia, as well as cultural differences in the description and perception of sound sensitivities. For instance, minoritized racial/ethnic groups may describe sound sensitivities differently than White individuals, and/or in a way that is not captured by these measures, which were validated among predominantly White samples (Schröder et al., 2013; Wu et al., 2014). Future work is needed to examine alternative measures of misophonia to further evaluate racial/ethnic and cultural differences in prevalence of misophonia.

In conclusion, this study estimated the prevalence of misophonia in the largest and most diverse sample to date. These data expand knowledge on misophonia and represent a critically important step toward establishing population norms. The key findings indicate that misophonia symptoms are somewhat common; yet, a small portion of individuals experience clinical levels of symptoms. In addition, analyses revealed that misophonia symptom severity was affected by gender, age, education, marital status, work status, and household income, suggesting that certain individuals are disproportionately affected by misophonia. Among individuals with clinical levels of misophonia, symptoms appear to onset early in life, are persistent, and contribute to significant life impairment. Continued research in this area and future replication of these findings with questionnaires that assess misophonia diagnostic criteria are critical.

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