



Perceptions of various treatment approaches for adults and children with misophonia[☆]

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ABSTRACT

Objective: Misophonia is a complex disorder characterized by a heightened reaction to certain sounds and associated stimuli. While there is no uniformly accepted treatment to date, different intervention approaches are being investigated. Individual's perceptions of different misophonia treatment methods may affect compliance and satisfaction with treatment options. We sought to gather data on patient perceptions of currently available misophonia treatments.

Methods: Using an online survey, we collected data about treatment preferences, treatment usage, and diagnosis history from parents of children with misophonia (N = 141) and adults with misophonia (N = 252).

Results: Most respondents were not satisfied with misophonia treatments that they or their children had previously received. Audiologic interventions including active and passive noise cancelling and lifestyle modifications were rated as most appropriate for treatment of misophonia by both parent and adult respondents.

Limitations: Because of the descriptive nature of this study, we chose to use a completer-only approach to ensure the data reflect the true responses of participants, though this did result in a meaningful proportion of missing data. Participants were selected through convenience sampling and responses were self-reported. Individuals with more severe misophonia symptoms may be more likely to participate and complete a research survey.

Conclusions: Most interventions are considered inappropriate by parents of youth with misophonia and by adults with misophonia. This should be interpreted in the light of a general lack of misophonia-specific interventions. Findings suggest dissatisfaction with currently available treatments and an opportunity for development of effective treatment strategies corresponding to participants' preferences. Deeper understanding of treatment preferences has the potential to guide future treatment development.

1. Introduction

Misophonia is characterized by decreased tolerance to specific sounds and associated stimuli, coupled with the presence of variable levels of distress and impairment (Lewin et al., 2021; Potgieter et al., 2019; Rosenthal et al., 2021). Although understanding of misophonia is increasing, there is a great deal that is unknown about the condition, and even less about its treatment. The limited treatment literature has primarily focused on various formats of cognitive-behavioral therapy

(CBT). Case studies/series (Bernstein et al., 2013; Jager et al., 2021; Lewin et al., 2021; McGuire et al., 2015), an open-label trial (Schröder et al., 2017), and one randomized controlled trial (Jager et al., 2020) have found treatment to be modestly effective in reducing misophonia symptoms. Few studies have focused on pharmacologic or neuro-modulation treatments although a clinical trial is being conducted (ClinicalTrials.gov identifier: NCT04348591). As the field advances in terms of available treatment options, it is currently unknown which therapies are preferred by individuals with misophonia, or which

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therapies parents find most acceptable for their children with misophonia.

Understanding patient preferences has important clinical implications. Patient preferences contribute to treatment initiation and leads to better treatment adherence and improved patient outcomes (Patel et al., 2016). Numerous factors can affect patient preferences for a given treatment including beliefs about treatment and its accessibility (Proctor et al., 2011). Among youth, understanding both parental and child treatment preferences is particularly important given that treatment decision making is likely to be shared between practitioner, parent, and child (Lewin et al., 2014a, 2014b).

The present study examines attitudes towards various treatment options among individuals with misophonia or parents of children with misophonia. Participants rated the “appropriateness” of a treatment strategy for addressing the symptoms of misophonia on a five-point scale from extremely inappropriate to extremely appropriate. We had two specific aims. First, we aimed to understand which treatments are most utilized by adults and children with misophonia as well as which treatments participants view as most appropriate for treating misophonia. We also evaluated diagnosis history for each participant, including whether they had been diagnosed with misophonia by a healthcare professional, and if so, that individual's specific profession (e.g., audiologist, psychiatrist, psychologist, etc.). Second, we evaluated whether severity of misophonia symptoms, age, or gender was associated with perceptions of different treatments. Given the exploratory nature of this study, no hypotheses were generated.

2. Methods

2.1. Participants

Two online surveys were distributed and completed from July 2021 to September 2021 using the Qualtrics survey platform. Each contained the same items with language adjusted to be completed by either adults with misophonia or parents of youth with misophonia. Participants were not compensated for their study participation. A description of the surveys and survey links were posted in online forums and social media pages as well as emailed to participants from a prior misophonia study. To be included in the study, participants had to be adults 18 years or older and either have misophonia or parent a child with misophonia.

A total of 184 parents of children with misophonia and 301 adults with misophonia started the survey. A total of 141 parents of children with misophonia and 252 adults with misophonia completed the survey. The average age of individuals with misophonia was 14.8 years for the Child survey ($SD = 4.3$) and 47.4 years for the Adult survey ($SD = 15.9$). Over half of the sample was female (Adult 78 %, Child 72 %) and most were Caucasian (Child = 89 %, Adult = 91 %). Most responses to the child survey and to the adult survey endorsed that misophonia had affected the patient's day-to-day functioning every day for the past 7 days (59 % and 45 %). Adult survey respondents were more likely to have not sought any treatment than Child survey respondents (25 % and 11 %). Most respondents to both surveys had a bachelor's degree or a graduate degree (Child = 78 % and Adult = 64 %). For a complete sample description, see Table 1.

2.2. Procedure

The Institutional Review Board at Baylor College of Medicine approved the study protocol and informed consent procedures before the survey's distribution. In the first page of each survey, the study purpose was explained, and participants were informed that their participation was completely voluntary and that their responses would be kept confidential. After reviewing the first page, participants consented by proceeding to the second page to begin the survey.

Table 1

Demographics and sample description.

	Child survey (n = 141)	Adult survey (n = 252)
Age M (SD)	14.8 (4.3)	47.4 (15.9)
Age of onset M (SD)	9.6 (3.2)	14.3 (11.4)
Gender N (%)		
Male	34 (24 %)	51 (20 %)
Female	101 (72 %)	196 (78 %)
Non-binary/Transgender	6 (4 %)	4 (2 %)
Race N (%)		
Asian	3 (2 %)	4 (2 %)
Black or African American	1 (1 %)	2 (1 %)
Native Hawaiian or Other Pacific Islander	1 (1 %)	1 (<1 %)
White	126 (89 %)	228 (91 %)
Other	10 (7 %)	15 (6 %)
Ethnicity		
Hispanic/Latino/Spanish Origin	15 (11 %)	13 (5 %)
Not Hispanic/Latino/Spanish Origin	112 (79 %)	201 (80 %)
Other	14 (10 %)	33 (13 %)
Misophonia Impairment (“During the past 7 days, my (child's) misophonia has affected my/his/her/their day-to-day functioning...”) N (%)		
Never	2 (1 %)	6 (2 %)
Rarely	4 (3 %)	23 (9 %)
Some days	19 (14 %)	57 (23 %)
Most days	33 (23 %)	53 (1 %)
Every day	83 (59 %)	113 (45 %)
Overall satisfaction with misophonia treatments N (%)		
Very dissatisfied	24 (22 %)	57 (32 %)
Moderately dissatisfied	21 (19 %)	22 (12 %)
Neither satisfied nor dissatisfied	23 (21 %)	28 (16 %)
Moderately satisfied	22 (20 %)	23 (13 %)
Very satisfied	8 (7 %)	4 (2 %)
Not applicable (have not sought treatment)	12 (11 %)	44 (25 %)
Parent education (child survey) or respondent education (adult survey) N (%)		
Less than high school education	0 (0 %)	8 (3 %)
High school graduate	7 (5 %)	17 (7 %)
Some college	14 (10 %)	35 (14 %)
Trade/technical/ vocational training	5 (4 %)	10 (4 %)
Associate's degree	4 (3 %)	19 (8 %)
Bachelor's degree	58 (41 %)	76 (30 %)
Graduate degree (master's doctoral, or professional degree)	52 (37 %)	85 (34 %)
Parent Age M (SD)	48.2 (6.6)	–
Parent Gender N (%)		
Male	10 (7 %)	–
Female	130 (92 %)	–
Parent Race N (%)		
Asian	2 (1 %)	–
Black or African American	1 (1 %)	–
Native Hawaiian or Other Pacific Islander	1 (1 %)	–
White	133 (94 %)	–
Other	3 (2 %)	–
Parent Ethnicity		
Hispanic/Latino/Spanish Origin	9 (6 %)	–
Not Hispanic/Latino/Spanish Origin	118 (84 %)	–
Other	13 (9 %)	–

2.3. Measures

2.3.1. Demographics

Following the cover page, demographic information was collected from adults with misophonia and parents of children with misophonia including age, gender, race, ethnicity, and level of education. In addition, the parent survey included demographic information on age, gender, race, and ethnicity of parents' children.

2.3.2. Misophonia

In the Misophonia sections, participants were asked if they (or their child) had been diagnosed with misophonia by a health professional and, if so, by which type of health professional. Items to assess severity

of misophonia symptoms included a question about age of onset of misophonia symptoms and one on daily functional impairment, modeled after the Clinical Global Impression – Severity (CGI–S) (Guy and Bonato, 1970). This item prompted participants to rate whether their (or their child's) misophonia affected daily functioning (1) never, (2) rarely, (3) some days, (4) most days, or (5) every day out of the last week.

2.3.3. Treatment approaches

Assessment of various treatment options was created using an iterative process including review of scientific literature, online misophonia forums, and online articles discussing misophonia treatments. First, a list of 42 potential treatments and treatment descriptions was created by the first and last two authors, and reviewed by other clinicians with expertise in misophonia. Treatments were then sorted into one of nine categories: Medications, Supplements, Lifestyle Modifications, Relaxation Strategies, Psychological Treatment, Audiologic Treatment, and Neuromodulation. Within each category, participants rated the appropriateness of specific misophonia treatment options on a five-point scale from extremely inappropriate to extremely appropriate. “Appropriateness” was not specifically defined. Survey items evaluating interventions like lifestyle modifications or supplements were phrased as “How appropriate is [strategy] for treating or managing your misophonia?” Each of the nine categories also included an item to determine which, if any, of the potential treatments in that category participants had previously used. Participants were instructed to rate all strategies, regardless of whether they had tried a given intervention.

Modes of Delivery section was included to gauge opinions on the appropriateness of family counseling, group therapy, and teletherapy as modes of treatment delivery. Participants assessed each mode of delivery on the same five-point appropriateness scale used in other sections of the survey.

2.3.4. Barriers to treatment

The Barriers to Treatment section included an item assessing overall satisfaction with the quality of misophonia treatment participants have previously received. Overall satisfaction was rated on a five-point scale from very dissatisfied to very satisfied.

2.4. Data analysis

Descriptive information regarding treatment experiences, diagnosis history, satisfaction with treatment, and misophonia impairment were analyzed. Next, treatments in each category were grouped together to create a mean “appropriateness” rating in order to compare perceptions of each treatment family. Appropriateness ratings across categories were found to have adequate internal consistency for both parents and adult self-report raters ($\alpha > 0.73$) except for audiology treatment ratings ($\alpha = 0.65$ for parent and 0.64 for adult self-report). Their distributions were not significantly skewed and did not have excessive kurtosis (all less than ± 2 SD of the mean) (George and Mallery, 2010). Across treatment categories, there were several significant differences between parent-proxy and adult self-report mean treatment appropriateness ratings, and thus analyses were conducted separately for each subsample rather than on data pooled across the two surveys. A repeated-measures ANOVA was conducted with the average treatment appropriateness variable to compare perceived appropriateness ratings across categories. Deviation contrasts were used (i.e., the mean of each treatment category was compared with the grand mean across treatment categories apart from a reference category, here being neuromodulation), with $p < .01$ being considered significant to account for multiple comparisons. t -tests were used to compare mean appropriateness ratings among those who had and had not tried a given treatment family, interpreting $p < .01$ as significant to minimize family-wise error with the high number of comparisons conducted.

Correlations between treatment appropriateness ratings, misophonia

impairment, and age were conducted. t -tests were used to compare gender differences in appropriateness ratings.

As is typical in online surveys, considerable attrition across the survey was noted. Across the two surveys, 83 % ($n = 393$) of participants who opened the survey completed demographics and filled out the first misophonia-specific questions (those assessing diagnosis history and overall misophonia impairment). Sixty-one percent ($n = 289$) completed the survey to the final item assessed in this analysis (overall satisfaction with treatment). Because of the descriptive nature of this study, we chose to use a completer-only approach to ensure the data reflect the true responses of participants.

For the parent sample, assuming $\alpha = 0.05$, power = 0.90, and the final completer only sample size of 110, this study was powered to detect an effect of $f = 0.20$ for the primary repeated-measures ANOVA analysis, reflecting a small-to-medium effect. For the adult sample, given the same assumptions but a completer sample size of 187, the study was powered to detect an effect of 0.12, a small effect.

3. Results

3.1. Diagnosis and treatment history

Over half of the parent sample endorsed a diagnosis for their child from a professional ($n = 84$, 60 %), with the most common diagnosing professionals being audiologists, psychologists, and primary care physicians. Self-diagnosis was more common in the adult sample, with only 21 % ($n = 53$) reporting they had been diagnosed by a healthcare professional. Among those who were diagnosed, the frequency of diagnoses from different professionals was similar, though adults endorsed a diagnosis from a psychiatrist relatively more often (15 % of adults who had been diagnosed vs. 6 % of youth). Please see Table 2 for a full summary.

The treatments/management strategies that had been most frequently tried were lifestyle modifications (96 % of parents endorsed having tried this strategy, 89 % of adults), followed by audiologic treatments (93 % and 87 %) and psychological therapies (89 % and 69 %). The next most popular treatment categories included relaxation (69 % and 70 %), supplements (58 % and 49 %), and psychotropic medications (44 % and 50 %). Neuromodulation was used less frequently (9 % and 11 %). Active and passive noise cancelling were the most common audiologic treatments; home rearrangement and modified event planning were the most common lifestyle modifications. Supportive therapy, mindfulness/acceptance-based therapy, and cognitive-behavioral therapy were the most used psychological treatments. As shown in Table 1,

Table 2
Diagnostic history.

	Child survey ($n = 141$)	Adult survey ($n = 252$)
Diagnosed with misophonia by professional (%)		
Yes	60	21
Audiologist ^a	32	24
Psychologist ^a	18	22
Primary care physician/pediatrician/family physician ^a	14	5
Therapist (not specified) ^a	7	15
Physician (not specified) ^a	8	7
Psychiatrist ^a	6	15
Other (included otolaryngologist, neurologist, social worker, developmental pediatrician, “misophonia specialist,” board certified behavior analyst, and psychiatric nurse practitioner, chiropractor) ^a	11	10
No	40	79

Note.

^a 14 parents and 7 adults indicated they had received diagnoses from 2 to 3 professionals, and thus percentages are calculated from the total number of providers listed ($n = 97$ for parents, 59 for adults).

41 % of parents and 46 % of adults reported being “moderately dissatisfied” or “very dissatisfied” with treatments received for misophonia.

For parent-report ratings, Mauchly's W was significant ($W = 0.17$, $p < .001$); the Greenhouse-Geisser-corrected test statistic indicated significant differences across groups, $F(6) = 44.46$, $p < .001$, $\eta_p^2 = 0.29$. Medications were rated as significantly less appropriate than other treatments, $d = 0.79$, $p < .001$, while lifestyle modifications were rated as significantly more appropriate, $d = 0.80$, $p < .001$, as were audiologic treatments, $d = 0.54$, $p < .001$. Other treatments were not found to be significantly different from typical treatment ratings.

For adult self-report ratings, Mauchly's W was significant ($W = 0.34$, $p < .001$). Greenhouse-Geisser-corrected test statistic indicated significant differences across groups, $F(6) = 66.71$, $p < .001$, $\eta_p^2 = 0.27$. Medications were rated as significantly less appropriate than other treatments, $d = 1.12$, $p < .001$, as were supplements, $d = 0.50$, $p < .001$, and psychological therapy, $d = 0.41$, $p < .001$. Audiologic treatments and lifestyle modifications were rated as significantly more appropriate, $d = 0.42$, $p < .001$, and $d = 0.32$, $p < .001$, respectively.

Significant variability in appropriateness ratings were noted in the psychological treatment group, and thus another repeated-measures ANOVA with deviation contrasts was conducted among treatments in this family. Significant differences in ratings were found among parents, $F(12) = 39.55$, $p < .001$. Psychological treatments that were rated as significantly more appropriate than the mean of all other ratings included: cognitive-behavioral therapy, mindfulness- and acceptance-based therapy, supportive psychotherapy, family counseling, and group therapy (all $ps < 0.001$). Treatments that were rated as significantly less appropriate included: equine-assisted therapy, exposure therapy, eye movement desensitization reprocessing, hypnosis, play therapy, and support groups (all $ps < 0.001$). Differences were also found in adult self-report, $F(11) = 55.61$, $p < .001$. Contrasts revealed the same pattern, with the exception that hypnosis was not significantly different than the mean treatment appropriateness rating (Table 3).

3.2. Associations with perceived treatment appropriateness

Because of the restricted range of misophonia impairment ratings and the skewed nature of these data, Spearman rank-order correlations were conducted to evaluate associations between misophonia severity and treatment acceptability.

With regard to demographic factors, age was not associated with any of the treatment appropriateness ratings in both parent and adult samples ($r < 0.18$, $p > .05$), apart from neuromodulation, which was rated as significantly less appropriate among younger adult participants ($r = -0.26$, $p < .001$). Regarding gender differences, female adult participants rated medications as significantly more appropriate than non-females, $t(212) = 2.33$, $p = .024$, $d = 0.48$, and showed a similar pattern with supplement ratings, $t(208) = 2.09$, $p = .038$, $d = 0.38$. Parents of female children also rated supplements as significantly more appropriate, $t(117) = 2.23$, $p = .027$, $d = 0.48$. Other gender differences were not significant (please contact authors for statistical details).

See Table 4 for a summary of mean comparisons of treatment appropriateness ratings among those who had versus had not tried a given treatment family, separated by parent-report and adult self-report. Parent- and adult self-report responses showed a similar pattern of significance and effect size in this analysis: appropriateness ratings were significantly higher among those who had tried psychotropic medications, supplements, and audiologic treatments, but there were not significant differences in appropriateness ratings for relaxation or psychological treatment. Lifestyle modifications were rated as more appropriate by adults who had tried these strategies. Insufficient numbers of parents reported not having tried lifestyle modifications ($n = 6$), audiologic treatments ($n = 8$), or having tried neuromodulation ($n = 10$), to conduct comparisons.

4. Discussion

This study investigated the treatment experiences and preferences of a large online sample of parents of children with misophonia and adults with self-reported misophonia. Most adults and a large portion of children were not professionally diagnosed with misophonia. The majority of both parent and adult participants were not satisfied with misophonia treatments they or their children had previously received. Lifestyle modifications and audiologic treatments involving noise cancellation were perceived as the most appropriate treatments. Medications were perceived as less appropriate and exposure therapy as least appropriate among both groups.

Among participants who sought professional help for their misophonia or for their child's misophonia, most utilized psychologists or audiologists. These professionals may be more likely to encounter individuals with misophonia in their practice. However, most participants were self-diagnosed.

With few exceptions (relaxation strategies, psychological treatment, and neuromodulation), participants who had tried a given treatment generally rated it as more appropriateness, though the direction of this association cannot be determined with this study, as it is likely that people who perceive certain treatments as more appropriate are more likely to try them, though it is also possible that their perceptions of appropriateness increased after trying a given treatment approach. It is interesting that individuals who had tried psychotherapy did not rate it as more appropriate than individuals who had not tried psychotherapy (parents and adults); when compared with significant differences in other treatment categories, this further highlights the inadequate experiences individuals have had in therapy for misophonia.

Findings suggest strong desire by participants to engage in treatment, though almost half described dissatisfaction with the treatment options they have previously pursued. Notably, when those who responded “neither satisfied nor dissatisfied” are included, over half of participants were not satisfied with available treatments for misophonia. It is apparent that there is a discrepancy between what patients' desire and what is available to them in the form of treatments. This could be related to a lack of treatment response. The survey results also indicate that there is still a significant need for development of effective therapies for misophonia.

Overall, audiologic treatments and lifestyle modifications were both the most popular and perceived to be the most appropriate treatments. Among audiologic interventions, active noise cancelling (addition of sound stimuli) and passive noise cancelling (sound protection such as ear plugs or headphones) were rated as most appropriate. The high appropriateness ratings of noise cancelling interventions and lifestyle modifications suggest that individuals with misophonia prioritize symptom management. The community seems to view misophonia as a chronic disorder to be managed rather than a condition that can be treated, but this view is likely affected by a general lack of misophonia-specific treatments. These views and perceptions may be investigated further in the future.

Medications were rated as less appropriate than other treatments among both parents and adults, which may reflect the lack of rigorous pharmacotherapy trials with misophonia as the primary target. The least appropriate treatment for both adults and children with misophonia was exposure therapy. Of note, exposure therapy was listed and described separately from CBT, which often includes this therapeutic approach. Thus, participants may have responded to CBT thinking that exposure therapy was a component of this treatment. On balance, CBT includes a number of components (e.g., cognitive restructuring, coping skills; Lewin et al., 2014a, 2014b) and real-world CBT often does not include exposure (Whiteside et al., 2020).

For youth, psychological treatment was almost as frequently used compared with others listed on the survey, although it was not perceived to be a significantly more appropriate treatment approach. This differs from the limited available literature, which suggests therapy may be an

Table 3
Treatment history.

	Children and adolescents			Adults	
	Have tried this treatment(%)	Perceived appropriateness (1–5)* M (SD)		Have tried this treatment (%)	Perceived appropriateness (1–5)* M (SD)
Medication (n = 125)			(n = 218)		
Antianxiety medications	33	3.39 (1.26)		33	3.05 (1.26)
Antidepressant Medications	34	3.15 (1.34)		39	2.78 (1.28)
Oxytocin nasal spray	1	2.79 (0.96)		1	2.76 (0.99)
Summary medications ^a	44	3.12 (0.99)		50	2.86 (0.97)
Supplements (n = 125)			(n = 214)		
Dietary supplements	28	3.66 (1.17)		25	3.28 (1.12)
Herbal tea	22	3.51 (1.19)		24	3.23 (1.08)
Multivitamins	38	3.70 (1.13)		36	3.31 (1.13)
Summary supplements ^b	58	3.62 (1.08)		49	3.27 (1.00)
Lifestyle modifications (n = 122)			(n = 207)		
Emotional support animal	34	3.98 (1.02)		22	3.34 (1.31)
Healthy diet	59	4.40 (0.76)		46	3.96 (1.01)
Home rearrangement	78	4.71 (0.57)		57	4.42 (0.85)
Journaling	30	3.90 (0.93)		23	3.37 (1.04)
Modified event planning	71	4.41 (0.76)		55	4.16 (0.99)
Regular sleep schedule	71	4.49 (0.79)		50	4.10 (0.90)
School accommodations	60	4.42 (1.02)		17	4.22 (1.00)
Exercise	66	4.44 (0.75)		60	4.13 (0.90)
Summary lifestyle modifications ^b	96	4.34 (0.49)		89	3.97 (0.63)
Relaxation (n = 118)			(n = 200)		
Autonomous Sensory Meridian Response (ASMR) Stimuli	19	3.45 (1.22)	(n = 199)	14	3.22 (1.27)
Diaphragmatic breathing	40	3.97 (0.89)	(n = 199)	46	3.72 (1.04)
Massage/acupressure	18	3.73 (0.90)		25	3.47 (1.04)
Meditation	27	3.91 (0.93)		44	3.68 (1.08)
Systemic muscle relaxation	21	3.91 (0.95)		39	3.59 (1.10)
Summary relaxation methods ^b	67	3.80 (0.78)		70	3.55 (0.88)
Psychological treatment (n = 115)			(n = 193)		
Family counseling (n = 112)	28	4.34 (1.00)	(n = 186)	19	3.98 (1.17)
Group therapy (n = 112)	5	4.04 (1.10)	(n = 186)	7	3.75 (1.20)
Teletherapy (n = 112)	34	3.68 (1.34)	(n = 186)	16	3.54 (1.22)
Cognitive behavioral therapy	48	4.23 (1.03)	(n = 192)	31	3.61 (1.20)
Mindfulness and acceptance-based therapy	35	4.27 (0.88)	(n = 192)	32	3.72 (1.11)
Supportive psychotherapy	42	4.26 (0.95)		34	3.78 (1.10)
Equine-assisted therapy (n = 113)	6	3.44 (1.01)	(n = 191)	2	2.79 (1.09)
Eye movement desensitization (n = 113)	3	3.3 (0.88)	(n = 191)	6	3.03 (0.97)
Exposure therapy (n = 113)	16	2.50 (1.43)	(n = 191)	19	2.08 (1.26)
Hypnosis (n = 113)	5	3.29 (0.97)	(n = 191)	13	3.27 (1.11)
Music therapy (n = 113)	18	3.75 (0.96)	(n = 191)	23	3.43 (1.09)
Play therapy (n = 113)	12	3.42 (1.01)		–	–
Support groups (n = 113)	18	3.83 (1.16)	(n = 191)	21	3.71 (1.14)
Summary psychological treatments ^b	89	3.69 (1.06)		69	3.36 (0.76)
Audiologic treatment (n = 117)			(n = 197)		
Active noise cancelling (n = 102)	93	4.57 (0.78)		70	4.46 (0.83)
Hearing aids	17	3.79 (1.12)		16	3.71 (1.00)
Passive noise cancelling	70	4.50 (0.85)		70	4.39 (0.86)
Tinnitus retraining therapy	9	3.75 (1.00)		4	3.58 (1.05)
Summary audiologic treatments ^b	93	4.16 (0.67)		87	4.06 (0.66)
Neuromodulation (n = 110)			(n = 187)		
Vagus nerve stimulation	1	3.39 (1.03)		3	3.56 (1.03)
Neurofeedback	4	3.56 (0.97)		2	3.66 (1.00)

(continued on next page)

Table 3 (continued)

	Children and adolescents		Adults	
	Have tried this treatment(%)	Perceived appropriateness (1–5)* M (SD)	Have tried this treatment (%)	Perceived appropriateness (1–5)* M (SD)
Transcranial magnetic stimulation	0	3.40 (0.94)	1	3.50 (0.99)
Deep brain stimulation	1	2.80 (1.14)	1	3.03 (1.15)
Summary neuromodulation ^b	9	3.30 (0.89)	11	3.43 (0.91)

^a Treatment appropriateness was rated on a 1–5 Likert scale, from 1 = Extremely inappropriate to 5 = Extremely appropriate.

^b Summary statistics include the number of participants who endorsed any treatment in each category and pooled M and SD of treatments in each category.

Table 4

Appropriateness ratings among those who had and had not tried each treatment family.

	Had tried this treatment M (SD)	Had not tried this treatment M (SD)	d
Adults			
Medication	3.15 (0.94)	2.57 (0.92)	0.62**
Supplements	3.56 (0.96)	3.00 (0.95)	0.58**
Lifestyle modifications	4.02 (0.58)	3.48 (0.78)	0.91*
Relaxation	3.63 (0.91)	3.36 (0.76)	0.30
Psychological treatment	3.30 (0.65)	3.38 (0.80)	0.12
Audiologic treatments	4.10 (0.65)	3.74 (0.66)	0.56*
Neuromodulation	3.32 (0.83)	3.44 (0.92)	−0.13
Parents of children			
Medication	3.59 (0.80)	2.74 (0.97)	0.95**
Supplements	3.89 (0.94)	3.29 (1.14)	0.58*
Lifestyle modifications ^a	–	–	–
Relaxation	3.87 (0.76)	3.68 (0.82)	0.24
Psychological treatment	3.70 (0.65)	3.77 (0.55)	−0.11
Audiologic treatments ^a	–	–	–
Neuromodulation	–	–	–

* $p < .01$.

** $p < .001$.

^a Not included in analyses because of very low number of parents who had not tried lifestyle modifications ($n = 6$ for lifestyle modifications; $n = 8$ for audiologic; $n = 10$ for neuromodulation).

effective and appropriate treatment for misophonia in children (McGuire et al., 2015). This highlights the need to engage individuals living with misophonia in the development of psychological therapies for this condition to ensure that they match the values and perspective of this community. Indeed, there are two ongoing trials testing various forms of cognitive-behavioral therapy for misophonia (Cecilione et al., 2021; Lewin et al., 2021), which build on prior results (Jager et al., 2020). Understanding the core treatment components of a cognitive-behaviorally oriented treatment protocol is highlighted as an area in need of further study and stakeholder engagement. For example, exposure therapy in its current form is generally considered dissatisfying and overemphasis of this treatment methodology could alienate some members of the community. These findings also underscore the need for interdisciplinary treatment efforts that emphasize audiologic, psychological, neurological and psychiatric perspectives to provide a range of treatment options that match patient preferences, as well as comparative effectiveness studies to determine the most efficacious approaches.

Adults reported less favorable views towards psychological treatment. Although 69 % reported trying some form of psychotherapy, it was rated as significantly less appropriate than other treatment approaches listed on the survey. It is worth noting, however, that the overall psychological treatment appropriateness mean rating may have been an underestimate of the perceived appropriateness of more specific

types of psychotherapy as this category included a number of treatments rated as highly appropriate (e.g., CBT, mindfulness and acceptance-based therapy) that were averaged with therapies with significantly lower appropriateness ratings (e.g., exposure therapy and equine-assisted therapy).

4.1. Limitations

There are several study limitations. First, most participants were self-diagnosed with misophonia and misophonia symptom severity was self-reported; it would have been preferable to use a validated scale such as the Amsterdam Misophonia Scale. Results may also be biased if participants with higher levels of education and of certain ethnicities were over-represented due to levels of awareness of misophonia. Because the survey did not ask detailed questions about participants' symptoms, there may be diversity in symptoms leading to variation in appropriateness of different treatments. Second, individuals with more severe misophonia symptoms may be more likely to participate in treatment research and may have been more likely to take and complete this study survey (as evidenced by the misophonia severity ratings that skewed towards the more severe). Third, participants were included based on self-reported misophonia symptoms. It is likely that some also presented with comorbid medical or psychiatric diagnosis which could impact self-reports. Fourth, there were no checks on participant comprehension of survey items. Finally, because of the descriptive nature of this study, we chose to use a completer-only approach to ensure the data reflect the true responses of participants, though this did result in a considerable proportion of missing data. In summary, clinicians and researchers are at the early stages of establishing evidence-based treatments for individuals with misophonia. Although there are some data to suggest CBT is effective in reducing misophonia symptoms, our survey indicates individuals may prefer lifestyle changes or audiologic interventions most. Participants seemed most consistently wary of psychotropic medications and supplements. Also significant is the finding that over half of both adult and parent respondents were not satisfied with the misophonia treatments they tried. These views should be interpreted in the light of a general lack of misophonia-specific intervention options. In that regard, interventions for misophonia differ from the availability of more specific or holistic treatments for other disorders. Clinicians and researchers may consider these findings when approaching conversations with patients or when planning future research into treatments for misophonia. Regardless, more research is needed to determine which treatment strategies are most effective for misophonia symptoms as well as which treatments are preferred and utilized. Future research should consider the effect of comorbid psychiatric conditions on individuals' perceptions of different treatment strategies for misophonia.

CRediT authorship contribution statement

Eleanor E.A. Smith conceptualized the project, drafted the manuscript, oversaw data collection, and contributed to statistical analysis.

Andrew G. Guzik analyzed the data and critically reviewed and revised the manuscript.

Isabel A. Draper conceptualized the project, drafted the manuscript,

oversaw data collection, and contributed to statistical analysis.

Jane Clinger facilitated data collection, helped conceptualize the project, and critically reviewed and revised the manuscript.

Sophie C. Schneider facilitated data collection, helped conceptualize the project, and critically reviewed and revised the manuscript.

Wayne K. Goodman facilitated data collection and critically reviewed and revised the manuscript.

Jennifer J. Brout facilitated data collection and critically reviewed and revised the manuscript.

Marjin Lijffijt helped conceptualize the project, and critically reviewed and revised the manuscript

Eric A. Storch conceptualized the project, critically reviewed the manuscript, oversaw data collection, and contributed to statistical analysis.

Conflict of Interest

Ms. Smith, Ms. Draper, Ms. Clinger, Dr. Guzik, Dr. Schneider, Dr. Goodman, Dr. Brout, and Dr. Lijffijt report no potential conflicts of interest.

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