Clinical Focus

Assessment and Management of Misophonia in a Female Adolescent: A Case Study

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Purpose: Misophonia is a condition in which individuals experience negative reactions, including anger and disgust, to specific sounds in their environment. Individuals with misophonia often report feelings of anxiety and a reduced quality of life. While there is no cure for misophonia, there are management protocols supported by case studies in the literature, including tinnitus retraining therapy (TRT) and Misophonia Management Protocol (MMP), along with coping strategies. The purpose of this case study is to contribute to the field of clinical research on patients with misophonia.
Method: Case studies involving misophonia are limited, and further research in this area is needed to provide evidence-based treatment. This case details misophonia questionnaires and assessment, case formulation, and management of misophonia in an 11-year-old girl, using a variation of both the TRT and MMP, including ear-level sound generators and coping strategies.
Conclusions: This case serves as a contribution to the evidence base for the use of sound therapy and coping strategies in the treatment and management of misophonia, as well as tools that are available in diagnosing misophonia. Clinical implications reveal sound therapy and coping strategies as a means to manage misophonia symptoms. Further research is needed for large-scale data to be available.

The term *misophonia* comes from the Greek words "misos" (hate) and "phon" (sound), meaning the hatred of sound, and was suggested by M. M. Jastreboff and Jastreboff (2002). It is referred to as a condition in which patients experience negative reactions (anger, annoyance, disgust, etc.) in response to specific sounds in their environment (breathing, pen-clicking, typing, swallowing, etc.; M. M. Jastreboff & Jastreboff, 2002). Misophonia typically begins in childhood or adolescence, with the most commonly reported age of onset to be approximately 12 years old (Edelstein et al., 2013; Kumar et al., 2014; Schröder et al., 2013). Because the trigger sounds are unpredictable as to when they will occur, the patient often experiences levels of anxiety, leading to actively avoiding exposure to the trigger sounds and a reduced quality of life (Schröder et al., 2013). The literature from Schröder et al. (2013) also suggests that misophonia persists and often worsens over time.

Diagnosis of misophonia requires an in-depth case history and audiological testing (Palumbo et al., 2018). The case history includes assessment of onset, trigger sounds, reactions to those sounds, and comorbid conditions. Several questionnaires are available for use in this area; however, none have been validated. While there is no consensus on a specific protocol that should be used to assess misophonia (Palumbo et al., 2018), an audiological assessment should include pure-tone thresholds and loudness discomfort levels (LDLs). Patients who present with misophonia may have normal hearing or hearing loss and may have LDLs in the normal-to-reduced range (P. J. Jastreboff & Jastreboff, 2013). Most patients with misophonia are thought to exhibit hearing thresholds in the normal-hearing region (Schröder et al., 2014). P. J. Jastreboff and Jastreboff (2015) noted that when hyperacusis, also known as decreased sound tolerance, is present with misophonia, LDLs can range from 30 to 120 dB HL, further showing that evaluating LDLs alone is not adequate in diagnosing hyperacusis or misophonia.

P. J. Jastreboff and Jastreboff (2006) designed a therapy program known as tinnitus retraining therapy (TRT) to treat the primary condition of tinnitus and secondary conditions of misophonia and hyperacusis. The therapy protocol consists of sound therapy that is paired with directive counseling that is adjusted to each individual patient's needs.

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Editor-in-Chief: Barbara Cone
Editor: Cynthia Richburg
Received June 7, 2021
Revision received August 4, 2021
Accepted August 14, 2021
https://doi.org/10.1044/2021_PERSP-21-00130

Disclosure: *The author has declared that no competing financial or nonfinancial interests existed at the time of publication.*

When hyperacusis and misophonia are present, it is recommended to first treat the hyperacusis and then treat the misophonia (P. J. Jastreboff & Jastreboff, 2015). Patients presenting with misophonia are instructed to avoid silence and overuse of ear protection and, instead, be exposed to sounds that are pleasant to listen to, along with constant low-intensity sounds to decrease the patient's negative reactions to their trigger sounds (Palumbo et al., 2018). Another treatment protocol termed Misophonia Management Protocol (MMP) was developed by Marsha Johnson. Based on the literature by Dozier (2015a), the MMP was adapted from the TRT protocol, and it consists of two parts. The first part entails the use of sound generators (environmental or ear-level) to reduce the perception of the misophonic sound, and the second part consists of 6–12 weeks of therapy (cognitive behavioral therapy [CBT], or similar) to develop coping techniques for changing negative reactions to the trigger sounds (Dozier, 2015a; Duddy & Oeding, 2014). Progressive muscle relaxation, mindfulness, compassion training, distress tolerance, and CBT have also been documented in case studies as other ways to manage misophonia; however, case studies of such nature in the literature are limited (Bernstein et al., 2013; Dozier, 2015b; Schneider & Arch, 2017).

Case Introduction

"Molly," an 11.5-year-old girl, was referred to our clinic by her pediatrician, for a hearing evaluation and an evaluation for misophonia. Molly and her mother reported that her misophonia began when she was 8 years old, with her first trigger sound being her mother eating. Her parents reported passive bullying in school that led to Molly experiencing high anxiety and nervous ticks. In response to the bullying, Molly switched schools, but her misophonia continued to progress to a severe, debilitating degree that affected her daily life around the time she turned 11 years old and entered the sixth grade. It was also reported that Molly suffered daily migraines around that time that were successfully treated with antihistamines; however, upon the cessation of the migraines, her trigger sounds worsened. Molly reported that upon hearing the trigger sounds, she felt emotional reactions of anger, accompanied by disgust, with the need to leave and "escape" the room for relief. Molly noted physical responses to her misophonia triggers, including muscle tightening and feeling "squirmy." Compensatory strategies that Molly implemented in school included the use of earbuds to mute her misophonia triggers; however, she noted that she would miss instructions the teacher would give in the classroom. This specific school promoted the use of gum-chewing and eating in class, therefore making the classroom environment a "problem setting" for Molly as her misophonia triggers included sounds such as chewing. The school created a "safe room" for Molly to retreat to when her misophonia triggers could not be tolerated. Molly would typically stay in the classroom for instruction only and would leave the classroom to get her work done, per parent report. Molly also reported not being able to tolerate eating meals together with her family, which caused her to feel guilt and sadness.

Misophonia Assessment

Molly was asked to fill out the assessment forms prior to her first visit at our clinic. The misophonia assessment forms can be downloaded from the Misophonia Institute website (Dozier, 2016). The questionnaires included the Misophonia History Questionnaire, Misophonia Assessment Questionnaire (MAQ), Amsterdam Misophonia Scale (A-MISO-S), Misophonia Impact Survey (MIS), Misophonia Activation Scale (MAS-1), Detailed Trigger Inventory (DTI), Misophonia Coping Responses (MCR), and Misophonia Emotional Responses (MER). It should be noted that these questionnaires/scales have not been tested for their reliability or validity, and currently, there are no validated assessments for the diagnosing of misophonia (Brout & Rosenthal, 2016). The patient was also given the Revised Children's Anxiety and Depression Scale (RCADS).

MAQ

The MAQ is a questionnaire developed by an audiologist, Marsha Johnson, with questions asking patients how much they are impacted by their misophonia. Scoring includes the sum MAQ score to indicate the severity of misophonia, with 1–21 indicating mild, 22–42 indicating moderate, and 43–63 indicating severe (Dozier, 2015c). It should be noted that this questionnaire should not be used to diagnose misophonia but to indicate the severity of misophonia symptoms and their impact on a person's life (Brout & Rosenthal, 2016). Molly's sum score at intake was 44, which rated her misophonia as "severe."

A-MISO-S

The A-MISO-S is a questionnaire developed by Schröder et al. (2013) that was adapted from the Yale–Brown Obsessive Compulsive Scale (Goodman et al., 1989). It is a six-item scale, with scores ranging from 0 to 24. The six items ask patients to rate their misophonia regarding time, interference, distress, resistance, control, and avoidance. Molly's sum score at intake was 16, indicating "severe" misophonia symptoms. The final question asks the patient, "What would be the worst thing, that could happen if you were not able to avoid the misophonic triggers?" to which Molly responded, "I would want to punch the person triggering me."

MIS

The MIS was developed by Tom Dozier in 2016 to be used as a counseling tool to gain insight on the impact misophonia has on interpersonal relationships, family life, social life and leisure activities, school and work, and personal activities. The questionnaire consists of five questions

ranging from 0 (none) to 10 (extreme). This questionnaire helps the clinician to highlight and discuss the different ways misophonia has affected the patient's life and relationships (Pellicori, 2020). At intake, Molly reported that her misophonia had interfered with her social life and leisure activities at a 7 (severely) and her schoolwork at a 9 (severely).

MAS-1

The MAS-1 focuses on the emotional and physical reactions a person may experience to a specific trigger (Fitzmaurice, 2010). It is scored on severity from Level 0, indicating no discomfort, to Level 10, indicating the person reacts with violence on a person, an animal, or self. At intake, Molly's emotional response was a Level 9, stating "panic/rage reaction in full swing, conscious decision not to use violence on trigger person."

DTI

The DTI is a form in which the patient can list the trigger sound, the source it comes from (person), and the emotional and physical responses to the trigger sound from 0 to 10, referencing the MAS-1 severity levels. At intake, the patient listed 11 trigger sounds, along with the emotional responses to those sounds ranging from 3 to 9. The items can then be listed in a hierarchy, from most bothersome to least bothersome (see Table 1).

MCR and MER

The MCR and MER questionnaires were designed by Tom Dozier in 2013, to be used as counseling tools. Pellicori (2020) refers to the MCR as an assessment that was designed for the clinician to gain more information on how the patient is coping with the misophonia. The MER is an assessment that was designed to identify maladaptive behaviors, as well as gain additional information on the patient's emotional reactivity toward specific trigger sounds (Pellicori, 2020). The emotional response is defined as "what you feel and not what you actually do." Because these questionnaires were designed as counseling tools, there is not a rating scale. Based on Molly's responses on the MCR, it was evident that she used "leaving the room" and "escape the trigger" as her main coping strategies over asking others to stop making the trigger sound. Molly's responses on the MER showed great distress, anger, and disgust toward the trigger sounds, as well as feeling fear, anxiety, and sadness when experiencing a trigger sound.

RCADS

The RCADS (Chorpita et al., 2015) was developed to assess anxiety and depression in boys and girls from the third to 12th grade. Chorpita et al. (2020) describe how the RCADS is divided into subscales, including Social Phobia, Panic Disorder, Major Depressive Disorder, Separation Anxiety Disorder, Generalized Anxiety, and Obsessive–Compulsive Disorder. Sum of the raw scores in each subcategory is then given a corresponding T score. A T score of 65 or higher indicates scores in the borderline clinical threshold (Chorpita et al., 2020). Due to the nature of misophonia and some underlying characteristics of obsessive–compulsive disorder and anxiety (Cusack et al., 2018; Webber et al., 2014), Molly was given this assessment at intake. While no subscale met the borderline clinical threshold, Molly scored the highest in Social Phobia with a T score of 62.

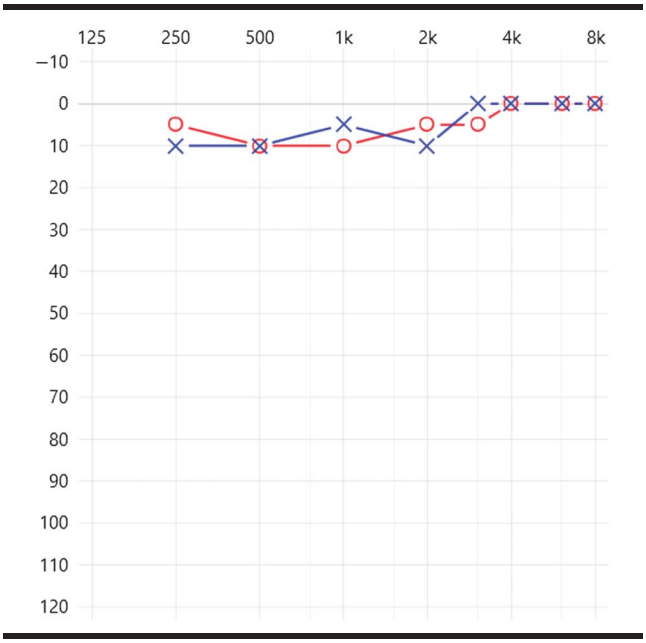
Audiologic Assessment

Tympanometry was assessed, and Molly presented with normal Type A tympanograms, suggesting normal middle ear pressure and normal tympanic membrane compliance. Acoustic reflex thresholds were present at normal sensation levels both ipsilaterally and contralaterally for both ears at all frequencies tested (500, 1000, 2000, and 4000 Hz). Audiometric testing was completed in a sound booth under insert earphones. Pure-tone audiometry revealed normal hearing bilaterally (250–8000 Hz) for air and bone conduction testing, with the worst threshold occurring at 10 dB (see Figure 1). Due to Molly's use of earbuds when not in harmful noise levels and the possible co-occurrence of hyperacusis, LDLs were tested and revealed a range of

Table 1. Molly's ratings of her trigger sounds on the Detailed Trigger Inventory at intake.

Trigger	Source (person)	Emotional response
1. Mouth noises—eating, chewing, lip-smacking, gulping	Anyone (self mildly)	9
2. Scratching	Other people (not self)	9
3. Skin rubbing together	Other people (not self)	9
4. Sniffing	Other people (not self)	8
5. Typing	Anyone	7
6. Loud breathing, yawning	All (makes me hate person)	7
7. Humming	Anyone	6
8. Pen-clicking, snap bracelet snapping	Anyone	6
9. Stirring chunky/liquidy stuff on stove	Cooking	5
10. Whispering	Anyone	5
11. Being in the presence of people	Anyone	3

Figure 1. Molly's audiogram at her initial diagnostic appointment.



65–75 dB for the right ear, and a range of 70–85 dB for the left ear, indicating hyperacusis bilaterally.

Treatment Recommendations and Implementation

Molly and her parents were counseled on therapy and management options, including hearing aids with Bluetooth capability to be used as ear-level maskers, CBT, TRT, and classical conditioning. It was recommended that Molly and her parents take a multidisciplinary approach to the misophonia treatment and that they seek out a consult with a psychologist experienced in CBT. It was also recommended that Molly consider an auditory processing evaluation to rule out an auditory processing disorder, as the literature suggests the possibility of impaired auditory processing in individuals presenting with misophonia (Pellicori, 2020; Schröder et al., 2014).

Hearing Aid Fitting and Orientation

Molly and her parents decided to pursue hearing aids to be used in the form of ear-level maskers. This enabled us to implement a variation of the TRT and MMP. Molly was fit with bilateral Oticon receiver-in-the-ear hearing aids that were set to be used as ear-level maskers 1 week following the initial diagnostic visit. Per the TRT recommendation, Molly's hyperacusis was treated with priority, with the gain in the hearing aids set to the lowest possible level instead of the microphones being deactivated. This was thought to assist in the acclimation to normal everyday loudness levels. The "Ocean 1" masker was chosen based on the patient's preference and was increased to a level that was most comfortable for Molly to utilize during her daily routine, while still being able to hear others speak to her. When setting the level of the masker, Molly's mother would perform certain trigger sounds (nose sniffling) in the clinic room to ensure the masking level improved Molly's ability to be exposed to the trigger sound. Molly's facial reactions to the trigger sounds were observed during the appointment, with and without the masker on. Molly's facial reaction was visibly reduced when the masker was turned on. Molly was taught how to use the Bluetooth capabilities of the hearing aids and was encouraged to become familiarized with the ReSound Tinnitus Relief app, to create and customize her own masking sounds that she had positive reactions to and that promoted relaxation.

Two-Week Follow-Up

Molly was seen 2 weeks following her hearing aid orientation. Data logging in the hearing aids revealed that Molly was using her maskers 7 hr per day. She reported that the use of the maskers and streaming of additional masking sounds from the ReSound Tinnitus Relief app helped with many of the trigger sounds in her environment. However, the "typing" sound on a computer remained a strong trigger that could not be masked easily. She also noted new trigger sounds of shoes squeaking on the gym floor and echoic rooms/hallways. It is not uncommon for persons with misophonia to develop additional trigger sounds, most often when a person's current trigger sounds encounter other sounds. According to Dozier (2015c), when a non-trigger sound occurs during the exposure of a trigger sound or while the individual is still upset or anxious from the trigger sound encounter, the non-trigger sound can then become a trigger sound. Molly was counseled to try to leave her maskers on for the day, instead of using them in reaction to her trigger sounds. She was instructed to be mindful of leaving the masking sound on in her background. Molly was scheduled to be seen again in 2 weeks for another follow-up and for an auditory processing evaluation.

One-Month Follow-Up and Auditory Processing Evaluation

Molly was accompanied by her father who assisted in case history. He reported that Molly had an appointment with a cognitive behavioral therapist as well as with a licensed professional counselor and misophonia specialist scheduled in the next month. He also reported that Molly was still only in the classroom for instruction, leaving to escape to her "safe room" about 4 times a day for relief from her trigger sounds. Molly noted two new trigger sounds beginning (silverware clanging, heavy breathing) and that she was still not eating dinner with her family, although she would like to. Data logging in the hearing aids revealed that Molly was using the masker 5 hr per day. Molly was again instructed to utilize the masker in her background throughout her day, rather than when she expected to be

exposed to her trigger sounds, thereby increasing the usage time. The microphones were deactivated on the hearing aids to perform solely as ear-level maskers. It was thought that by doing this, the possibility of the hearing aids amplifying her "new" triggers would be eliminated. Molly was readministered the DTI and was asked to rate her emotional reaction to each trigger sound with the masker off and with the masker on (see Table 2). The results did not show improvement in her emotional reaction to her trigger sounds when utilizing the maskers. Molly was then counseled on implementing relaxation techniques immediately following school to de-stress and prep herself for any trigger sounds that may occur during her evening routine. Mindfulness, progressive muscle relaxation, and yoga were discussed as possible options. This implementation may also make the goal of eating dinner as a family attainable. Molly was also instructed to keep a diary to document what relaxation techniques were used, for how long, and if she saw improvement in her reactions to the misophonia triggers on a scale of 0–10 (0 indicating *no improvement*, 10 indicating *extreme improvement*). Molly was seen at our center for an auditory processing evaluation on this date as well. The auditory processing results ruled out an auditory processing disorder. It was recommended that Molly return to our center for another follow-up in 2 weeks.

Six-Week Follow-Up

Molly was accompanied by her father who assisted in case history. He reported that Molly had her initial evaluation with the cognitive behavioral therapist the day prior to this appointment. He noted that he did not believe that treatment for the misophonia would be included in the therapy at this time. He also noted that her appointment with the licensed professional counselor and misophonia specialist was scheduled in the next week. Molly and her father reported that they did not complete the misophonia diary for documentation of relaxation techniques. Molly did try a meditation recording that she reported helped, but she needed her father to help walk her through it as the recording contained too much "heavy breathing" and it triggered her. At this appointment, the tinnitus masker volume control upper limit was increased from +7.5 to +10.5 dB to give Molly more flexibility and control over managing her trigger sounds. She was counseled on the use of the volume control of the masker and streaming to the hearing aids via Bluetooth. Data logging in the hearing aids revealed using the masker an average of 16 hr per day, a large improvement from the 5 hr per day of use documented at the previous appointment. The relaxation techniques discussed at the previous appointment were reviewed with Molly. Molly also noted that it was extremely difficult to complete her homework assignments with the amount of classroom instruction that she was able to tolerate. Therefore, it was recommended that Molly's teachers begin giving her assignments before the lectures so that Molly could familiarize herself to the task at hand and give her a goal of what instruction she needed to commit to prior to escaping to her "safe room." Because Molly was still not eating dinner with her family, it was recommended to begin by facing away from her family as they eat, to eliminate any visual triggers, while also using her maskers. Molly was scheduled to return to our center for a follow-up in 2 weeks.

Two-Month Follow-Up

Molly was accompanied to this appointment by her father who assisted in case history. Molly reported that she wears her hearing aids as ear-level maskers while at school and is now only leaving the classroom about once per day for relief from her trigger sounds (previously only staying in the classroom for instruction). She typically takes the hearing aids off when at home; however, she reported that her father has seasonal allergies, and she has been wearing the maskers to compensate with the "sniffling" sound. She had her first consult with the licensed professional counselor and misophonia specialist and reported that during the appointment, relaxation and visualization techniques were discussed, as well as medications to help with the anxiety. Molly decided against taking any medications and wished to focus on the relaxation techniques, implementing taking a relaxing bath after school to ease her nerves before beginning her homework. Molly also noted that she is in bed at 8:00 p.m. every night, as she found that the more sleep she gets, the more she can tolerate her trigger sounds. She continues to see her cognitive behavioral therapist and reported that appointments

Table 2. Molly's ratings of her trigger sounds on the Detailed Trigger Inventory with the masker off versus on at her 1-month follow-up.

Trigger	Emotional response Masker off	Emotional response Masker on
1. Mouth noises—eating, chewing, lip-smacking, gulping	10	7
2. Scratching	9	8
3. Skin rubbing together	9	8
4. Sniffing	10	10
5. Typing	10	9
6. Loud breathing, yawning	10	10
7. Humming	7	5
8. Pen-clicking, snap bracelet snapping	10	10
9. Stirring chunky/liquidy stuff on stove	7	5
10. Whispering	6	6

Table 3. Molly's ratings of her trigger sounds on the Detailed Trigger Inventory with the masker off versus on at her 10-week follow-up.

Trigger	Emotional response Masker off	Emotional response Masker on
1. Mouth noises—eating, chewing, lip-smacking, gulping	10	8
2. Scratching	10	8
3. Skin rubbing together	10	8
4. Sniffing	9	8
5. Typing	9	9
6. Loud breathing, yawning	9	8
7. Humming	7	6
8. Pen-clicking, snap bracelet snapping	9	9
9. Stirring chunky/liquidy stuff on stove	7	5
10. Whispering	6	6

consist of asking Molly questions and trying visualization techniques. During our appointment, Molly wanted to make note that she decided not to make eating dinner with her parents a goal, as it created too much anxiety for her. The misophonia diary was reissued to Molly to complete over the next 2 weeks, to track her daily anxiety and bothersome, as well as activities that may improve her misophonia.

Ten-Week Follow-Up

Molly completed the DTI, rating her emotional response to her trigger sounds with the masker on and with the masker off. Only slight improvement was seen on Molly's ratings of her trigger sounds with the masker on (see Table 3). However, it is important to note that Molly reported that her maskers allow her to stay in the classroom for the entire school day without having to retreat to her "safe room," with certain sounds still being difficult to be around. Molly also reported that she sits in the lunchroom with her classmates during lunch, only struggling when others around her are eating soup or chips. She noted using relaxation techniques 2–3 times a week and continues seeing her cognitive behavioral therapist. Based on Molly's overall demeanor and outlook of how she is doing at school, it was agreed that the next appointment could be pushed out to a follow-up in 3 months. Molly did not continue services with our clinic after the 10-week follow-up.

Discussion

While no misophonia questionnaires/assessments have been validated, the aforementioned assessments can be used as tools to document misophonia severity and triggers. The plan for this patient was to readminister all of the misophonia assessment documents at the 6-month follow-up. However, the patient did not return for that appointment. This could be due to the positive results seen at the 10-week follow-up, with the use of the ear-level maskers and relaxation techniques allowing Molly to remain in the classroom setting for the full day. The DTI was thought to be able to show progress in Molly's ratings of her trigger sounds over the course of her treatment; however, these ratings did not change significantly. This is similar to a misophonia case study treated with CBT, in which the subject still found her trigger sounds unpleasant, but they no longer hindered her social or occupational abilites (Bernstein et al., 2013). It would therefore be beneficial to develop a questionnaire that assesses a patient's tolerance of their trigger sounds over time. The MAQ and A-MISO-S questionnaires have been used to document progress in other misophonia case studies (Schneider & Arch, 2017), and it is therefore recommended to utilize these tools for such purposes. The main source of improvement from the case study presented is that, at the beginning of treatment, Molly was only able to remain in the classroom setting during instruction. After 10 weeks of ear-level masker use, Molly was able to remain present in the classroom for the entire school day without having to "escape the trigger." So while her ratings of the trigger sounds on the DTI did not improve substantially, her ability to tolerate the trigger sounds improved as she was able to maintain control of her normal day at school, therefore emphasizing the benefits of utilizing a combination of sound therapy and coping strategies for management of misophonia.

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