



## Brief Empirical Reports

## Case study: A novel application of mindfulness- and acceptance-based components to treat misophonia



Rebecca L. Schneider\*, Joanna J. Arch

Department of Psychology and Neuroscience, University of Colorado Boulder, Boulder, CO, USA

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## ABSTRACT

Misophonia is an important, yet understudied, psychological condition characterized by feelings of extreme anger and disgust in response to specific human-generated sounds. Several promising case studies using cognitive behavioral therapy to treat misophonia have been published, but given the limited work to date, exploring additional treatment options and expanding the potential options available to clients and clinicians remains important. In order to target the high levels of anger and disgust, we treated a case of misophonia in a 17-year-old male using 10 (50-min) individual sessions based on mindfulness- and acceptance-based components drawn from dialectical behavior therapy and acceptance and commitment therapy. In particular, we focused on acceptance, mindfulness, opposite action, and nonjudgmentalness strategies. At 6-month follow-up, the client reported no significant difficulties and a continued decline in symptoms. Theoretical rationale and treatment implications are discussed.

## 1. Theoretical and research basis for treatment

Misophonia is an understudied, difficult-to-treat condition characterized by extreme sensitivity to specific human (and sometimes animal; Cavanna & Seri, 2015) generated sounds, including chewing, slurping, and pen tapping (Schroder, Vulink, & Denys, 2013). In the presence of bothersome sounds, individuals with misophonia experience an aversive reaction, which can be immediate and overwhelming and involve feelings of anger or rage, disgust, and anxiety. Although misophonia has been proposed for inclusion in the DSM under the category of obsessive-compulsive and related disorders (Schroder, et al., 2013), remarkably little is known about the etiology and treatment of this condition (see Cavanna & Seri, 2015 for a more extensive review of misophonia and its etiology).

Initially, misophonia was treated by audiologists using tinnitus retraining therapy (TRT; Jastreboff & Jastreboff, 2002), which attempts to extinguish conditioned misophonia reactions by pairing the offending sounds with a neutral noise (e.g., white noise generator) that dilutes their effects (this technique is also used in the treatment of tinnitus and hyperacusis). However, TRT works to some extent by *masking* the offending sounds, which can be viewed as a form of avoidance similar to using headphones or earplugs to distract oneself or reduce unwanted sounds, risking reinforcing the notion that such sounds are undesirable

and intolerable on their own. In addition, it is unclear the extent to which TRT is an effective treatment for misophonia, as to our knowledge, no controlled studies on this approach have been published.

More recently, a small number of case studies have been published that employ cognitive behavioral therapy (CBT) to systematically restructure thoughts and gradually expose individuals to triggering sounds, suggesting the potential of CBT to successfully treat misophonia (Bernstein, Angell, & Dehle, 2013; McGuire, Wu, & Storch, 2015). However, despite preliminary success, no controlled studies on this approach have been conducted. One clinician has also reported using a counterconditioning or neural repatterning technique<sup>1</sup> to treat the physical reflex in misophonia (Dozier, 2015a, 2015b). This technique, however, is highly experimental and limited in that the successful treatment of one misophonia trigger does not appear to generalize to non-treated triggers (Dozier, 2015c). To our knowledge, no other psychological treatment approaches have been studied for the treatment of misophonia.

Although the CBT-based case studies in particular appear promising, it would enhance the understanding and treatment of misophonia if therapists had multiple viable psychosocial treatment options. Moreover, acknowledging the (unfortunately) large portion of community clinicians who report discomfort in delivering exposure-based treatment (Deacon & Farrell, 2013; Hipol & Deacon, 2013), or who

\* Correspondence to: 345 UCB Muenzinger Boulder, 80309-0345 CO, USA.

E-mail address: [Rebecca.L.Schneider@colorado.edu](mailto:Rebecca.L.Schneider@colorado.edu) (R.L. Schneider).

<sup>1</sup> This technique involves pairing a brief, low-level version of the trigger stimulus with a louder positive stimulus (e.g., a favorite song) such that the trigger stimulus only elicits a brief, mild physical reaction, and progressively reducing the volume on the positive stimulus while maintaining the mild level of reaction.

deliver exposure in sub-optimal doses (Farrell, Deacon, Kemp, Dixon, & Sy, 2013), we also reasoned that exploring the viability of an alternative, mindfulness- and acceptance-based approach based on components<sup>2</sup> within the CBT family (but that is not strictly a cognitive therapy or exposure-based approach) would expand both the research domains and range of behavioral approaches available to those researching and treating clients with misophonia.

Acceptance and commitment therapy (ACT; see Hayes, Strosahl, & Wilson, 1999 and Hayes, Strosahl, & Wilson, 2012 for a more extended review of this treatment and Harris, 2009 for a practitioner's guide) has demonstrated similar efficacy to CBT in the treatment of mixed anxiety disorders (Arch et al., 2012), social anxiety disorder (Craske et al., 2014), and obsessive compulsive disorder (OCD; Bluett, Homan, Morrison, Levin, & Twohig, 2014), and thus represented a promising alternative to explore. As misophonia is associated with strong emotions experienced as intolerable across a variety of settings (Schroder et al., 2013), an ACT-based framework for the treatment of misophonia appeared clinically relevant given its emphasis on acceptance rather than symptom reduction. ACT's focus on targeting a range of emotions, rather than solely focusing on anxiety, also appeared clinically relevant, since anxiety is not as prominent in misophonia as in OCD and other anxiety disorders (Schroder, et al., 2013).

Misophonia triggers are often initially localized to a small number of sounds or behaviors produced by a small number of people in the client's life (Schroder et al., 2013). As a person with misophonia increases their avoidance of these triggers, the number and type of triggers increase, until the triggers and attempts to avoid them become impairing (Edelstein, Brang, Rouw, & Ramachandran, 2013). From an ACT perspective, it is not the misophonia triggers themselves that cause problems in the client's life, but rather the avoidant response to such triggers. Relatedly, the client's *relationship* to the triggers, that is, their *fusion* with the associated thoughts also creates problems by increasing the desire for avoidance. Therefore, from an ACT perspective, in addition to making space for the difficult feelings that arise in response to triggers, it is also important to create distance from the associated thoughts to reduce their control over one's life and increase the ability to live in line with one's values.

Dialectical behavior therapy (DBT; see Linehan, 1993 for a more extended review of this treatment and Linehan, 2014a, 2014b for the skills training manual) represented another theoretically relevant framework for the treatment of misophonia, given its emphasis on targeting anger, a primary emotion in misophonia, and its emphasis on distress tolerance. The components of acceptance and distress tolerance taught in ACT and DBT seemed particularly relevant given that even brief exposure to misophonia triggers is associated with immediate, overwhelming feelings of anger, rage, and disgust that can be experienced by clients as intolerable. In addition to acceptance and distress tolerance, our treatment also incorporated the components of mindfulness, opposite action, and nonjudgmentalness, as taught in DBT and to some extent, in ACT. Mindfulness and opposite action were taught in conjunction with the treatment focus on acceptance of difficult emotions, while nonjudgmentalness was taught in conjunction with the focus on creating distance from difficult thoughts. Therefore, we prioritized the identification of behavioral intervention components that targeted key clinical features of misophonia.

Based on this logic, we recently treated a case of misophonia using mindfulness- and acceptance-based components and strategies drawn from DBT and ACT. In that neither approach is yet validated, tailored, or manualized for the treatment of misophonia, we did not select a single treatment package and deliver all elements from that package.

<sup>2</sup> Although ACT and DBT often use different terms to refer to the individual techniques used in treatment (e.g., "process" in ACT and "skill" in DBT), we use the term "components" throughout this article in order to employ a common language in referring to the techniques drawn from ACT and DBT.

Rather, as noted, we derived the behavioral components from ACT and DBT that appeared most theoretically and clinically relevant to misophonia and deliberately employed those in treatment. Specifically, we primarily conceptualized treatment from an ACT perspective, first using ACT components at the beginning of treatment to shift the client's perspective on thoughts and feelings, and then bringing in DBT components to help facilitate this shift in perspective. This approach is in line with existing literature using ACT in conjunction with other behavioral technologies (e.g., acceptance-based exposure therapy, England et al., 2012; ACT plus habit reversal training, Twohig & Woods, 2004).

Although we acknowledge that several of these components could also be conceptualized from a CBT perspective, as mindfulness- and acceptance-based cognitive behavioral therapies do overlap to some extent with more recent CBT approaches (Arch & Craske, 2008), framing the components from mindfulness- and acceptance-based CBT perspectives more precisely reflected our case conceptualization and intervention approach. To our knowledge, this is the first reported case of misophonia successfully treated with a mindfulness- and acceptance-based approach.

## 2. Case introduction

"Michael," a 17-year-old high school senior, was referred to our clinic by his mother for distress and anger caused by eating-related sounds. Although he had been annoyed by these sounds since middle school, his annoyance had recently reached a high level of anger and rage, accompanied by an extreme, uncontrollable "fight or flight" response, negative thoughts directed at the intolerable feelings ("I can't stand this") and at the offending persons ("They're disgusting"), and increasing levels of behavioral avoidance. This avoidance significantly interfered across a variety of domains, including school, friends, and family. Michael reported that he had a hard time concentrating or staying present in school because classmates often ate or chewed gum in class; he tried to avoid certain students altogether who were especially triggering. He also told several of his friends to not eat around him and would get angry if they forgot. Michael refused to eat most meals with his family, often arranging his schedule so that he would not be present at family dinners, and avoided his family whenever they were snacking (which was often). By the time Michael came in for treatment, his behavior was increasingly being driven by avoidance, rather than by his values, he was increasingly fused with negative judgments of his misophonia triggers, and his ability to tolerate the distressing feelings provoked by his triggers was increasingly low. Michael did not report any other concerns or difficulties, and thus treatment focused exclusively on his symptoms of misophonia. Michael provided written consent for his case to be described in a case report.

## 3. Assessment

At intake, Michael met criteria for misophonia based on information gathered in an unstructured clinical interview assessing how his symptoms map onto the diagnostic criteria proposed by Schroder et al. (2013) and the Amsterdam Misophonia Scale (A-MISO-S; Schroder et al., 2013), see Fig. 1. In addition, on the Structured Clinical Intake for DSM-IV Disorders (SCID; First, Spitzer, Gibbon, and Williams, 2002) Michael reported subthreshold symptoms of obsessive-compulsive disorder (e.g., fleeting violent intrusive thoughts, needing to lock his door up to 20 times per night) that were not time-intensive or distressing and thus considered subthreshold, as well as a recent major depressive episode that remitted without treatment.

### 3.1. Amsterdam misophonia scale

The A-MISO-S is a questionnaire developed by Schroder, et al.

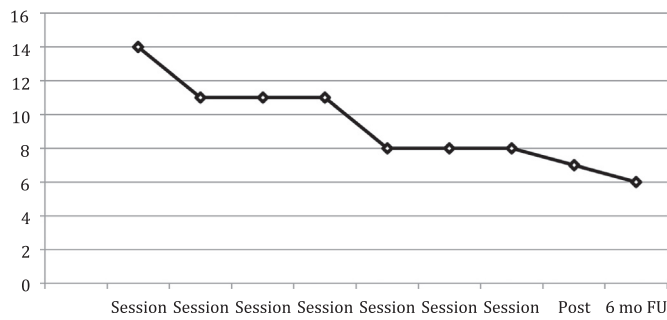
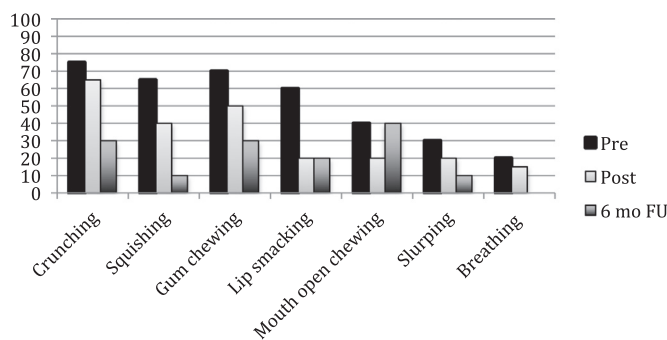


Fig. 1. Amsterdam Misophonia Scale.

(2013) based on the Yale Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al., 1989). It is comprised of 6 questions that ask users to rate their misophonia symptoms in terms of time, interference, distress, resistance, controllability, and avoidance, on a scale from 0 to 4; scores can range from 0 to 24, with scores from 0 to 4 considered subclinical, 5–9 considered mild, 10–14 moderate, 15–19 severe, and 20–24 extreme. Michael scored toward the upper limit of the moderate range at the beginning of Session 1.

The A-MISO-S was administered at sessions 1, 3, 5, 7, 8, 9, and 10 (with sessions generally occurring weekly, excluding a 2-week gap from session 4–5 and a 1-month gap from session 8–9 due to client travel), as well as at 1-week post-treatment (Post) and 6-month follow-up (6-month FU, i.e., 6 months after Post) to measure misophonia symptoms (see Fig. 1). The PHQ-9 (Kroenke & Spitzer, 2002) and GAD-7 (Spitzer, Kroenke, Williams, & Löwe, 2006) were administered at sessions 1, 3, 5, 7, 9, and 1-week post treatment to assess depression and general anxiety; Michael did not report symptoms of depression or anxiety on these measures at any time during treatment. As shown in Fig. 2, a hierarchy of triggers, along with client ratings of his strength of reaction and need to respond to each was created in Session 1 and subsequently reassessed at Post and 6-month FU.

### Strength of Reaction



### Need to Do Something

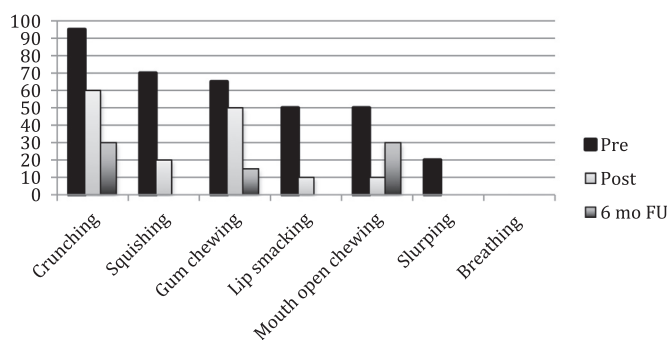


Fig. 2. Client misophonia hierarchy.

## 4. Case conceptualization and treatment overview

Michael came to our clinic in late April 2015. He was leaving for college in August, with one month of vacation planned in July, permitting only 2.5 months for the entire treatment, with an extended break in the middle. Although exposure therapy can work quickly in some cases, we were reluctant to use a traditional CBT treatment package in case this time frame proved to be insufficient for completing traditional CBT with exposure (or exposure alone), particularly given the intensity of Michael's rage and disgust reactions. Together with our desire to examine alternative treatments, this concern led us to examine other possible treatment options.

Based on Michael's report that his misophonia reactions reflected immediate, uncontrollable, and overwhelming feelings of anger and disgust, we chose to approach treatment from a mindfulness- and acceptance-based perspective, with the primary objective to improve the tolerability and acceptability of his reactions. We began treatment with acceptance and defusion components drawn from ACT to help Michael to create psychological distance from his misophonia-related thoughts and openness towards his feelings of anger. Specifically, we aimed to help Michael defuse from the thoughts such as "I can't stand this!" and "Why are they eating right now!," as well as to defuse from actual eating sounds, such that they no longer represented "eating noises," but rather a more neutral collection of diverse sounds.

Michael also reported that his misophonia reactions varied slightly depending on factors such as how he was feeling at the time and who was making the noise; for example, in intake he reported feeling very angry in response to his father for eating dinner one night, but that his anger dissipated immediately when he turned to look at his father and realized it was just his cat eating. Thus, we believed that identifying the thoughts and behaviors exacerbating his reactions (but without trying to change or counter them as is done in traditional CBT) could also serve as an important treatment target. We thus approached his thoughts from the nonjudgmental stance as taught in DBT, teaching Michael how to approach eating situations by describing facts, rather than judgments. DBT's approach to increasing nonjudgmentalness through the use of specific worksheets and exercises (see Linehan, 2014a, 2014b) allowed for a more concrete and incremental approach to change in our less-willing client. However, an ACT-based emphasis on noticing judgments and separating them from facts while practicing mindfulness would likely provide another effective approach to increasing nonjudgmentalness.

Although we discussed the course of Michael's misophonia reactions and factors that strengthened or weakened these reactions early in treatment, midway through treatment we found ourselves desiring a finer-grain analysis of cause and effect. Although this level of detail can be achieved using techniques drawn from a number of different traditional CBT treatments, we chose to achieve this using DBT chain-analysis. The DBT chain analysis provides a concrete, highly detailed, well-structured framework for functional assessment (Rizvi & Ritschel, 2014), and thus was appealing for an adolescent client that responded well to structured hands-on worksheets. However, similar work could be conducted within a less formal (but similarly detailed) approach to functional assessment. The introduction of chain analyses for eating occasions marked our transition from teaching underlying concepts using techniques primarily drawn from ACT to teaching concepts using techniques primarily drawn from DBT, although we also continued to draw from ACT as noted. This shift from ACT to DBT components reflected our desire to tailor the treatment strategies based on the client's presentation rather than delivering a predetermined set of skills from a single treatment package. Through chain analysis, we learned that when Michael heard or anticipated hearing an eating noise, he would physically tense his body to prepare for the next occurrence of the noise. Since it seemed that this anticipatory tension could be counterproductive, serving to intensify and reinforce Michael's misophonia response, we asked Michael to engage in the "opposite action"

move of physically relaxing his body in anticipation of the noise. This move was related to what is taught in applied or cued relaxation (Borkovec & Costello, 1993), in which clients are instructed to systematically relax muscle groups when cued by the presence of anxiety. In contrast to applied or cued relaxation, however, we did not provide any formal relaxation training or any instruction beyond “try to relax your body whenever you want to tense it” and thus do not consider this instruction to fully reflect applied or cued relaxation. Nonetheless, this instruction proved to be remarkably helpful. As a result, we expanded our conceptualization of treatment to include an emphasis on bodily relaxation. We conceptualized this as an “opposite action” on a physical level, in keeping with our conceptualization from a DBT perspective. Opposite action represents a central skill taught in DBT, in which clients are instructed to engage in the opposite behavior as the emotion’s action urge in order to decrease the link between the stimulus and the unjustified response (Lynch, Chapman, Rosenthal, Kuo, & Linehan, 2006). This skill could also be presented from a similar (traditional) CBT-based framework. Opposite action has traditionally been conceptualized as a behavioral approach to changing one’s emotions (Linehan, 2014a). However, this skill could fit within an ACT-consistent framework if presented with a different intention in mind, as we did, such that the client is instructed that the goal is *not* to change their internal state or promote relaxation as an alternative to anger, but rather to create more flexibility in their *behavioral* response to sounds in order to move towards valued directions. ACT has previously been successfully paired with competing response training (e.g., ACT plus habit reversal training for trichotillomania; Twohig & Woods, 2004), suggesting that instructions to engage in a competing behavioral response can be effectively incorporated into an ACT framework as well.

## 5. Course of treatment

Treatment consisted of 10 50-min sessions.

### 5.1. Sessions 1 and 2

Treatment began with psychoeducation on misophonia, anger, and the fight-or-flight response, including a discussion on the connection between thoughts, behavior, and physiology. Michael created a hierarchy of misophonia triggers and began identifying what made his reactions better or worse. In the initial phases of treatment he tracked trigger situations, related thoughts, and distress using self-monitoring forms.

### 5.2. Sessions 3 and 4

In sessions 3 and 4, we introduced ACT values and cognitive defusion skills. Michael identified personal values of respect, learning, and interpersonal connectedness, and evaluated whether his habitual reactions to eating sounds brought him closer to or further from his values. After using metaphors and personal experience to discuss how thoughts, feelings, and other people remain largely out of our control, we introduced the component of cognitive defusion as a way of changing our relationship with thoughts. Defusion exercises employed in session included the “lemons, lemons, lemons” exercise (a derivation of the “milk, milk, milk” exercise; Masuda, Hayes, Sackett, & Twohig, 2004), saying thoughts in different voices and visualizing them in different fonts, labeling thoughts as thoughts (e.g., “I’m having the thought that...” and “I notice I’m having the thought that...”), and mindful observation of thoughts (e.g., leaves on a stream exercise; Hayes et al., 1999). Michael reported that using defusion created some distance between him and his thoughts, rendering them less overwhelming and less influential over his behavior.

### 5.3. Sessions 5 and 6

We spent the next two sessions conducting DBT-style chain analyses (see Linehan, 2014b for the worksheets used) to compare situations eliciting stronger and weaker misophonia reactions. Michael noticed that being well rested and feeling in control of the situation and his actions weakened his reaction. He also identified physically tensing in anticipation of eating sounds, which he reported strengthened his misophonia reaction. Thus, we invited him to try the “opposite action” move of physically relaxing instead of tensing, which proved highly effective. He found it difficult to remain angry when his body was relaxed, and was thus able to increase his exposure to more challenging situations for greater lengths of time as a result.

### 5.4. Sessions 7 and 8

In sessions 7 and 8, we reviewed strategies for general stress management and introduced the notion of mindfulness; Michael began practicing mindfulness during everyday activities. Since his thoughts were often directed at specific people (“you’re disgusting”), we also introduced the DBT component of nonjudgmentalness. Specifically, we had Michael practice noticing his judgmental thoughts and re-describing the situation objectively (just the facts), beginning with easier situations (e.g., related to his sister) and moving to more difficult situations (i.e., misophonia situations). Noticing and describing the situation nonjudgmentally diffused Michael’s anger such that he no longer felt angry towards specific people when they ate. Experiencing his anger more diffusely rather than as specifically directed towards individual people served to improve Michael’s relationships with his family and friends. To practice accepting emotions triggered by others’ eating, we did an acceptance-based mindfulness of anxiety exercise adapted from an ACT for anxiety protocol (Eifert & Forsyth, 2005), which we transformed into a mindfulness of anger and disgust exercise while listening to a recording of someone eating chips. Though Michael found this challenging, afterwards he described his anger and disgust emotions as feeling “less all-consuming” than usual, as a result of acknowledging and making space for the emotions rather than struggling against them.

### 5.5. Sessions 9 and 10

After a month-long break following Michael’s July vacation, in sessions 9–10 we reviewed skills and worked on relapse prevention. Specifically, we brainstormed what aspects of college might be more difficult in terms of misophonia triggers and beyond. We also reviewed how his initial misophonia triggers developed to identify warning signs for the development of new triggers.

### 5.6. Post-treatment through 6-month follow-up

One week later, Michael re-rated his misophonia hierarchy (see Fig. 2). He reported automatically relaxing in anticipation of others’ eating and feeling far less triggered. Two months later, he reported having almost no issues. 6 months post-treatment, Michael again rated his misophonia hierarchy and completed the misophonia questionnaires. Impressively, his scores across all measures had continued to decrease. Notably, although his reaction to open mouth chewing had returned to its baseline strength level (the sole hierarchy item that did not continue to decrease), his need to do something in response to such chewing remained much lower than at baseline, indicating that Michael was better able to accept and tolerate the discomfort triggered by his misophonia.

## 6. Treatment implications

To our knowledge, this is the first reported case of misophonia

successfully treated with mindfulness- and acceptance-based behavioral components and their associated strategies. The client was able to make significant treatment gains in as few as 10 weekly sessions. Treatment components were derived from ACT (acceptance, mindfulness, defusion, and values) and DBT (acceptance, mindfulness, nonjudgmentalness, and opposite action) perspectives, although several techniques utilized could also be conceptualized from a classic CBT perspective (e.g., identifying the link between thoughts, feelings, and behaviors). This speaks to the commonalities in goals, change principles, and therapeutic targets across CBT treatments (Mennin, Ellard, Fresco, & Gross, 2013). This commonality across treatments allowed us to select treatment components from the CBTs that appeared to best match our targeted areas, rather than focus exclusively on a specific treatment package. In doing so, we drew from ACT and DBT, which together explicitly address the above-mentioned targets. However, we acknowledge that these targets could likely also have been addressed from within a classic CBT perspective.

Interestingly, having the client physically relax rather than tense in response to misophonia triggers, a concept which we framed as an “opposite action” move but which also closely resembled applied relaxation (Borkovec & Costello, 1993), appeared to serve as one of the most powerful elements of therapy. Although this was initially difficult for Michael to do, by the end of treatment the client began automatically relaxing in eating situations that would usually elicit tension; he reported that his relaxation prevented his annoyance from escalating into the more overwhelming feeling of rage. This suggests that the use of muscle relaxation skills may prove helpful in teaching clients to better manage misophonia-related distress and tension, as reported in two case reports (Dozier, 2015a, 2015b), though further research is required.

This case study provides preliminary evidence for the use of mindfulness- and acceptance-based strategies in the treatment of misophonia. The apparent tolerability of this approach is important given the extreme levels of distress and discomfort reported by those with misophonia. In addition, we saw significant improvements after only ten sessions, suggesting that mindfulness- and acceptance-based strategies may be particularly efficient in the treatment of misophonia. However, it is important to note that initial scores on the A-MISO-S were in the moderate range; thus, it will be important to assess whether this approach remains efficient among more severe clients.

Given that this is a single case study, it will be necessary to test these findings in a larger, more systematic, randomized controlled trial. If our findings are replicated, we believe that our treatment approach may provide an important and valuable addition to the extremely limited literature on treatment for misophonia and warrants continued exploration.

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