

Running head: CBT TREATMENT OF MISOPHONIA CASE

THE MIXED-METHODS CASE STUDY OF “ZARA”: COGNITIVE BEHAVIOR
THERAPY TREATMENT OF A COLLEGE STUDENT WITH MISOPHONIA
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APPROVED:

Daniel Fishman, PhD

Daniel Cruz, PhD, ABPP

DEAN:

Francine Conway, PhD

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Abstract

This single-subject, mixed-method, behavioral analytic case-study dissertation presents a systematic, 12-session cognitive behavior therapy (CBT) treatment of “Zara,” an undergraduate student with severe misophonia. Misophonia is a rare condition characterized by an aversive response of sympathetic nervous system (SNS) activation and negative emotions (e.g. anger, disgust, and/or anxiety) elicited by the presence of specific and commonly encountered sounds (e.g. lip-smacking, chewing). Distress caused by trigger sounds and efforts to avoid and escape from these sounds often result in impairment in functioning. The goals of this case study are to (1) detail the assessment process used; (2) document and analyze the successful implementation of the CBT intervention; and (3) evaluate hypotheses regarding the mechanisms of change. The intervention utilized an A-B research design with a six-month follow-up. The independent variable consisted of a multi-component treatment that included skills training in cognitive restructuring, mindfulness and exposure procedures. The treatment was designed to reinforce adaptive and appropriate coping responses and extinguish the aversive respondent conditioned responses and the negatively reinforced inappropriate coping responses. The dependent variables included both behavioral outcomes (e.g. inappropriate coping behaviors, avoidance, and social interference) and subjective report outcomes (e.g. sensitivity to sounds, distress, and reported SNS response). The Amsterdam Misophonia Scale and the Misophonia Questionnaire were collected to evaluate changes in misophonia symptoms. At the end of treatment, the intervention was associated with a substantial improvement in all dependent variable measures. The largest reduction in symptoms occurred following session five, the first session with prolonged exposure exercises. At the six-month follow-up, which was completed by an independent evaluator, Zara reported an increase in her subjective “sensitivity” to trigger sounds; however, she remained at

CBT TREATMENT OF MISOPHONIA CASE

post-treatment levels in terms of her subjective SNS distress, use of inappropriate coping behaviors, avoidance, social interference, and overall misophonia symptoms. These findings support the role of two mechanisms of change as being responsible for Zara's long-term relief: (a) skills training in cognitive restructuring; and (b) the expectancy violation and behavioral experimentation components of exposure therapy. The case concludes with a discussion of the intervention's limitation and recommendations for future research.

CBT TREATMENT OF MISOPHONIA CASE

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CBT TREATMENT OF MISOPHONIA CASE

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TABLE OF CONTENTS

Abstract.....	ii.
Acknowledgements.....	iii.
List of Tables.....	ix.
List of Figures.....	x.
List of Appendix Pages.....	xi.

CHAPTERS	PAGE
I. CASE CONTEXT AND METHOD.....	1
a. The Rationale for Selecting this Particular Client for Study.....	1
b. The Clinical Setting in Which the Case Took Place.....	2
c. Methodological Strategies Employed for Enhancing the Rigor of the Study..	3
e. Confidentiality.....	3
II. THE CLIENT.....	4
III. GUIDING CONCEPTUALIZATION WITH RESEARCH AND CLINICAL EXPERIENCE SUPPORT.....	5
a. Defining Misophonia.....	5
i. Diagnostic Criteria.....	7
ii. Differential Diagnosis of Misophonia.....	8
iii. Comorbid Psychiatric Diagnoses.....	12
b. Theoretical Conceptualization of Misophonia.....	14
i. Jastreboff and Jastreboff's Theoretical Model.....	14
ii. Neurological and Emotional Factors.....	15
iii. Behavioral and Learning Factors.....	16
iv. Cognitive Factors.....	18
c. Guiding Conceptualization.....	20
d. Treatment Literature.....	22

CBT TREATMENT OF MISOPHONIA CASE

	e. Specific Intervention Components in Literature.....	27
IV.	ASSESSMENT OF THE CLIENT’S PRESENTING PROBLEMS, HISTORY OF PRESENTING PROBLEMS, GOALS AND STRENGTHS	31
	a. Presenting Problems.....	31
	b. History of Presenting Problems.....	32
	b. Relevant Background Information.....	34
	c. Presentation at the Beginning of Therapy.....	35
	d. Diagnosis.....	35
	e. Strengths.....	37
V.	CASE FORMULATION AND TREATMENT PLAN.....	39
	a. Case Formulation.....	39
	b. Developing the Treatment Plan.....	40
	c. Phases of Treatment.....	45
	d. List of Treatment Goals.....	45
	e. Measures.....	45
	i. Measures of Treatment Progress and Outcomes.....	45
	ii. Measures to Evaluate Non-Specific Therapeutic Factors.....	51
	e. Analysis Plan.....	52
	i. Quantitative.....	52
	ii. Qualitative.....	53
VI.	COURSE OF TREATMENT.....	54
	a. Phase I: Setting the Stage.....	54
	i. Intake Session 1.....	54
	ii. Between Intake Sessions 1 and 2.....	56
	ii. Intake Session 2.....	58
	iii. Motivational Interviewing Techniques.....	62

CBT TREATMENT OF MISOPHONIA CASE

b.	Phase II: Cognitive Restructuring.....	63
i.	Treatment Session 1.....	63
ii.	Treatment Session 2.....	66
iii.	Adding Additional Components to Treatment Plan.....	69
c.	Phase III: Building on What Works, Mindfulness, Relaxation and Prepping for Exposure.....	70
i.	Treatment Session 3.....	70
iv.	Treatment Session 4.....	72
d.	Phase IV: Graded Exposure Exercises.....	75
i.	Treatment Sessions 5.....	75
ii.	Treatment Sessions 6 – 10.....	79
e.	Phase V. Consolidating Gains and Maintenance Plan.....	80
i.	Treatment Session 10.....	80
f.	Six-Month Follow Up.....	81
VII.	THERAPY MONITORING AND USE OF FEEDBACK INFORMATION.....	83
VIII.	CONCLUDING EVALUATION OF THE THERAPY PROCESS AND OUTCOME.....	86
a.	Treatment Outcomes.....	86
i.	Evaluation of Changes in Misophonia Symptoms.....	86
ii.	Evaluation of Treatment Goals	87
b.	Evaluation of Non-Specific Treatment Factors.....	91
c.	Reflections on Guiding Conceptualization and Mechanisms of Change.....	92
d.	Comparisons to Previously Published Cases.....	94
e.	Limitations.....	95
IX.	DISCUSSION.....	97
X.	REFERENCES.....	99
XI.	TABLES	110
XII.	FIGURES	123
XIII.	APPENDIX.....	130

LIST OF TABLES

Table #		Page #
1	Table 1. Schröder et al. (2013) Proposed DSM Criteria for Misophonia	7
2	Table 2. CBT Treatment Studies in Misophonia Literature.....	110
3	Table 3. Exposure SUDS Hierarchy (Crunching Trigger Sound)	113
4	Table 4. Session-to-Session: Overall Misophonia Symptoms.....	114
5	Table 5. Session-to-Session: Amsterdam Misophonia Scale.....	115
6	Table 6. Session-to-Session: Misophonia Questionnaire: (MQ-P2) Coping Behavior and Emotions	116
7	Table 7. Session-to-Session: Counseling Center Assessment of Psychological Symptoms – 62 (CCAPS-62)	117
8	Table 8. Pre-Post Treatment Outcomes	118
9	Table 9. Post Treatment - 6 Month Post Treatment Outcomes.....	119
10	Table 10. Pre-Post-6 Mo.: Measure of Inappropriate or Undesired Coping Responses (Goal 1)	120
11	Table 11. Pre-Post-6-Mo: Responses Related to Sensitivity & Distress Associated with Trigger Sounds (Goal 2)	121
12	Table 12. Pre-Post-6 Mo. Avoidance and Interference Related to Triggers (Goal 3)	122

LIST OF FIGURES

Figure #		Page #
1	Figure 1. Flow Chart of Guiding Conceptualization	123
2	Figure 2. Session-to-Session: Amsterdam Misophonia Scale (Same data as Table 3).....	124
3	Figure 3. Pre-Post-Six Months: Amsterdam Misophonia Scale.....	124
4	Figure 4. Session-to-Session Misophonia Questionnaire Part 3: One-Item Severity of Sound Sensitivity Scale (Same data as Table 3).....	126
5	Figure 5. Pre-Post-Six Months Misophonia Questionnaire Part 3: One-Item Severity of Sound Sensitivity.....	127
6	Figure 6. Session-to-Session Misophonia Questionnaire Total Score (Parts 1 and 2) (Same data as Table 3).....	128
7	Figure 7. Pre-Post-6 Months Misophonia Questionnaire Total Score (Parts 1 and 2)	129

LIST OF APPENDIX DOCUMENTS

Appendix Letter	Page #
A Instruments.....	130
1 Amsterdam Misophonia Scale.....	130
2 Misophonia Questionnaire	132
B Subjective Units of Distress Thermometer	134
1 SUDS: The Distress Thermometer.....	134
C Homework Form	135
1 CBT Thought Monitoring Worksheet	135
D Sample Exposure Stimulus.....	136
1 Picture of Exposure Stimuli	136

CHAPTER I

Case Context and Method

The Rationale for Selecting This Particular Case

I selected “Zara” for this study for several reasons. First, she met Schröder, Vulink, & Denys’ (2013) diagnostic criteria for misophonia. Second, her presentation was straightforward and not complicated with comorbid psychiatric diagnoses. This is atypical in the literature on misophonia, where clients often present with additional psychiatric diagnoses such as obsessive compulsive disorder (OCD) (Johnson et al., 2013; Reid, Guzick, Gernand, & Olsen, 2016) and depression (McKay, Kim, Mancusi, Storch, & Spankovich, 2017; Schneider & Arch, 2017; Wu, Lewin, Murphy, & Storch, 2014; Zhou, Wu, & Storch, 2017). Third, Zara was an excellent candidate for a CBT intervention that included graded exposure therapy. She had strong executive function skills and communication abilities. She also demonstrated motivation to pursue treatment and insight into the negative effects of her reaction to misophonic triggers on her life. Her cooperative attitude and her ability to tolerate some psychological and physiological distress were also positive indicators that she would response well to a CBT intervention and exposure therapy (Foa & McLean, 2016; Persons, 2008) . Fourth, Zara demonstrated enthusiasm about completing between-session homework. Finally, Zara’s case is unique in that she is a woman of color from a West African country.

In addition to Zara’s personal attributes, I selected this case as an exemplar of misophonia. Misophonia is a condition “marked by extreme intolerance of specific classes of sounds resulting in aversive emotional responses and avoidance of situations where exposure to these sounds may occur” (McKay et al., 2017, p. 1). Descriptions of the features of the condition have only recently been documented and diagnostic criteria proposed by Schröder et al. (2013)

CBT TREATMENT OF MISOPHONIA CASE

are still in a conceptual stage. Currently, Misophonia is not included in the Fifth Edition of the Diagnostic and Statistical Manual (DSM-5; American Psychiatric Association, 2013) or the Tenth Edition of the International Classification of Disorders (ICD-10; World Health Organization, 1992). Research on biological or other causal elements of the disorder is limited, but the growing literature suggests that the condition may represent a unique psychiatric diagnostic condition (Kumar et al., 2017; Schröder, Vulink, & Denys, 2013). Since misophonia is a newly described condition whose nosology is still under debate, there are no empirically supported treatments. There are also no randomized controlled studies of interventions. Zara's case study can add meaningful information to the existing body of knowledge on the condition.

In the following case study, I will share the insight that I gained during the course of Zara's assessment, treatment, and follow-up. This study includes my review of the literature on the etiology of misophonia, core features and proposed diagnostic criteria for the disorder, considerations that guided the assessment process, the selection of progress and outcome measures, and outcomes in the case. I hope that the background research, description, and successful outcome of this case can help to smooth the diagnosis and treatment of misophonia for other clinicians as well as provide insight for future randomized control trial intervention studies. I also hope that I can use this study to demonstrate how ongoing analysis of qualitative and quantitative progress and outcome data can be used to inform treatment decisions and determine an appropriate termination point.

The Clinical Setting in Which the Case Took Place

The client was treated at the Counseling Center (CC) on the campus of a large public research university in the Northeastern United States. The CC provides individual and group outpatient therapy, psycho-educational testing, crisis management, substance use, and psychiatric

CBT TREATMENT OF MISOPHONIA CASE

services to a culturally diverse student body of undergraduate and graduate students. The clinical staff at the CC is composed of a multidisciplinary team of mental health professionals. The CC is also a training site for pre-doctoral psychology interns and fellows.

At the time of the case, I was an advanced Doctor of Psychology (Psy.D.) candidate in an American Psychological Association accredited school psychology program at the university. I worked under the clinical supervision of a licensed psychologist with expertise in counseling psychology and neuropsychological assessment. My supervisor's knowledge of the neuropsychological and biological mechanisms of psychiatric disorders was invaluable in informing my conceptualization and treatment plan. The first of two intake sessions was set up within two weeks of Zara's completion of the intake forms.

Methodological Strategies Employed for Enhancing the Rigor of the Study

I took detailed progress notes and wrote them up after each session. My clinical supervisor reviewed my case conceptualization, data collected, and progress notes. In addition to the behavioral data provided by the client, I used three quantitative outcome measures. These included two outcome measures specific to misophonia as well as a measure of psychological functioning completed by all students seen at the CC. These measures are discussed further detail in the "Measures" heading in Chapter V.

Confidentiality

During intake, the client provided informed consent to receive treatment in addition to endorsing the CC's privacy practices. Notes were stored in a HIPPA-compliant electronic recordkeeping system. "Zara" is a pseudonym and no identifying information was included in this case study.

CHAPTER II

The Client

“Zara” is a 19-year-old female college student in her second year of undergraduate study. She is black and from a country in West Africa with an ongoing civil war. She is a middle child. Her younger brother (age 17) lives with her biological parents in her home country and her 20-year old older sister attends a university in another region of the United States. She lives on campus in a suite with three other female students. Zara referred herself to the CC in order to address her self-diagnosed misophonia. Zara’s symptoms were consistent with those described in the literature. They included intense and “overwhelming” feelings of anger, disgust, and anxiety, impulsive urges to verbally and physically aggress, and physiological distress in the presence of others who produced her trigger sounds. She described four trigger sounds, all of which were mouth generated and involved eating or drinking: slurping, chewing of crunchy foods, lip smacking, and teeth picking (with either a toothpick or fingernail). Zara reported that her symptoms began at age 14, when she felt “intense anger” and “immediately” yelled at her mother to stop smacking her lips while eating a mango. At the time of the intake, Zara reported that her misophonic symptoms were leading her to withdraw socially in an effort to avoid situations where she anticipated encountering misophonic trigger sounds.

CHAPTER III

Guiding Conceptualization with Research and Clinical Experience Support

Defining Misophonia

The term “misophonia” derives from the Greek words *miso* (hatred) and *phonia* (sound) (Jastreboff & Jastreboff, 2014). Misophonia involves a strong and immediate negative emotional reaction of anger, “rage,” disgust, and/or anxiety along with a physiological sympathetic nervous system (SNS) “fight or flight” stress response in the presence of specific “trigger” sounds (Schröder et al., 2013). Trigger sounds are typically produced by other people, with the most common being repetitive sounds related to oral functions such as breathing, chewing, slurping, swallowing, and lip smacking. Other common trigger sounds that are not produced by oral functioning include marking with a pencil, clacking a keyboard, crinkling paper, or squeaking Styrofoam (Brout et al., 2018; Edelstein, Brang, Rouw, & Ramachandran, 2013; Schröder et al., 2013). Physiological responses typically include increased heart rate and blood pressure, tensed muscles, and sweating (Edelstein et al., 2013). Exposure to trigger sounds can result in impulsive urges to engage in aggressive behavior towards the person producing the noise as well as a strong desire to escape or avoid situations where the sounds could be encountered. Efforts to anticipate and avoid these sounds can dominate one’s lifestyle, social interactions and occupational choices (Rouw & Erfanian, 2018).

The intensity of the misophonic response does not appear to be influenced by the decibel level of the sound (Schröder et al., 2014). Triggers can be idiosyncratic and specific to certain persons and situations. For example, one person chewing chips may trigger a misophonic response while another person chewing chips does not. Descriptive and qualitative studies of the disorder (Edelstein et al., 2013; Kuehn, 2015) suggest that the relationship that one has with the

CBT TREATMENT OF MISOPHONIA CASE

person producing the sound can modulate the intensity of the response. Because family members, friends, classmates, coworkers, and intimate partners can evoke the most aversive responses, many clients with misophonia report that their symptoms have resulted in damaged or terminated relationships, unemployment, school dropout, and social isolation (Schwartz, Leyendecker, & Conlon, 2011). These characteristics of the condition suggest that learning and contextual cues play a role in the misophonic response.

Clinical audiologist Dr. Marsha Johnson was one of the first to describe the condition in the 1990s. She used the terms selective sound sensitivity syndrome (SSSS or 4S) and soft sound sensitivity (P. J. Jastreboff & Jastreboff, 2014). Dr. Johnson started an online forum to support people with “4S,” a term that is regularly cited in the popular press (Brout et al., 2018). The term misophonia was first used in the peer-reviewed literature by the audiologists Jastreboff and Jastreboff (2000). Misophonia received little notice from researchers until stories about the condition appeared in the popular media in 2011 (Berman, 2011; Kivi, 2011; Smith-Squire, 2011) and 2012 (Cohen, 2012; Leaker, 2012). This media attention led people suffering from misophonia to seek intervention and support. A search of Web of Science in August 2018 found 66 peer-review articles that cite “misophonia” in the abstract or title with 33 or 50% of these articles published in 2017 and 2018 alone.

Currently, misophonia is not formally recognized as a psychiatric or neurological disorder in the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V; American Psychiatric Association, 2013) or the Tenth Edition of the International Statistical Classification of Diseases and Related Health Problems (ICD-10; World Health Organization, 1992). In presenting their diagnostic criteria, Schröder et al. (2013) argued that the features of misophonia reflect a unique cluster of psychiatric symptoms distinct from existing diagnoses in

CBT TREATMENT OF MISOPHONIA CASE

the DSM-5. Given that research into the causes and biological mechanism of the disorder is emerging, it is unlikely that misophonia will be included in these diagnostic manuals in the near future. Currently, researchers in the field are calling for more research and increased funding to better understand features of the disorder and identify effective treatment (Kumar et al., 2017).

Diagnostic Criteria. Most of the available literature on misophonia remains descriptive, with limited empirical, clinical, or theoretical research. Dutch researchers Schröder, Vulink & Denys (2013), completed some of the earliest research on misophonia. See Table 1 for the proposed DSM diagnostic criteria put forward by Schröder et al. (2013).

Table 1

Schröder et al. (2013) Proposed DSM Criteria for Misophonia

Letter	Criterion Required for a Diagnosis
A	The presence or anticipation of a specific sound, produced by a human being (e.g., eating sounds, breathing sounds), provokes an impulsive aversive physical reaction, which starts with irritation or disgust that instantaneously becomes anger).
B	This anger initiates a profound sense of loss of self-control with rare but potentially aggressive outbursts.
C	The person recognizes that the anger or disgust is excessive, unreasonable, or out of proportion to the circumstances or the provoking stressor.
D	The person tends to avoid the misophonic situation, or if he/she does not avoid it, endures encounters with the misophonic sound situation with intense discomfort, anger, or disgust.

Table 1 (continued)

E	The person's anger, disgust, or avoidance causes significant distress (i.e., it bothers the person for whom he or she has the anger or disgust) or significant interference in the person's day-to-day life (e.g., the anger or disgust may make it difficult for the person to perform important tasks at work, meet new friends, attend classes, or interact with others).
F	The person's anger, disgust, and avoidance are not better explained by another disorder, such as obsessive-compulsive disorder (e.g., disgust in someone with an obsession about contamination) or posttraumatic stress disorder (e.g., avoidance of stimuli associated with a trauma related to threatened death, serious injury, or threat to the physical integrity of self or others).

Differential Diagnosis of Misophonia. Misophonia is a rare phenomenon that overlaps with other physiologic, neurologic, and psychiatric conditions (Kumar et al., 2017; Schröder et al., 2013). Given its rarity and shared features with other disorders, it is common for clinicians to dismiss, overlook, or misdiagnose patients with the condition (Brout et al., 2018). Clinicians who encounter misophonia in their practice should be familiar with how it has been characterized in the past and with the audiological, neurological and psychiatric disorders that should be ruled out as part of a differential diagnosis.

Differential diagnosis with audiological and neurological disorders. Misophonia is often erroneously grouped with hyperacusis and tinnitus, both common audiological disorders. According to the American Speech-Language Hearing Association (ASHA), hyperacusis is a “rare hearing disorder that causes sounds, which would otherwise seem normal to most people,

CBT TREATMENT OF MISOPHONIA CASE

to sound unbearably loud” (Goodson, 2015). Patients with hyperacusis have increased sensitivity to certain frequencies and volume ranges of sound, which can cause physiological pain in one’s ears, increases in autonomic heart rate, and galvanic skin response (GSR) (Goodson, 2015; Schwartz et al., 2011). Fear of and annoyance at encountering these sounds is common, but these responses are typically secondary to physical discomfort (Song et al., 2014). The primary causes of hyperacusis are head trauma or repeated exposure to loud noise. Common noises such as a car engine, dishes clanking, or loud conversation often cause a person with hyperacusis enough discomfort to avoid such situations (Goodson, 2015). According to the American Tinnitus Association (2018), tinnitus is a condition wherein one hears sounds when no actual external noise is present (American Tinnitus Association, 2018). Tinnitus is commonly referred to as “ringing in the ears,” but the actual sound can manifest in many different ways, including buzzing, hissing, whistling, swooshing, and clicking (American Tinnitus Association, 2018).

Misophonia is distinguishable from hyperacusis in that the misophonic response can be triggered by sounds in a wide range of decibel levels, tones, or pitches (P. J. Jastreboff & Jastreboff, 2014). For example, a common misophonic trigger is the sound of heavy breathing, which is often quieter than typical spoken conversation. Misophonia is distinguished from tinnitus in that misophonic distress occurs in response to an identifiable external stimulus. The misophonic response is often activated by the meaning, social context, or interpretation of the trigger sound (Bruxner, 2016; Schröder et al., 2013). For example, most people with misophonia do not usually find animals’ chewing, smacking, and breathing to be aversive, while the same sounds made by humans can produce significant distress (Schröder et al., 2013). This variability in triggers and their contextual specificity supports the classification of misophonia as a psychiatric condition rather than an audiological disorder (Schröder et al., 2013).

CBT TREATMENT OF MISOPHONIA CASE

Tourette syndrome is a neurodevelopmental disorder characterized by chronic multiple motor or vocal tics (Hazen et al., 2008). It shares some features with misophonia in that individuals with Tourette syndrome often report acute awareness, distraction, and distress associated with auditory sensation (Neal & Cavanna, 2013). Tics have been described as a means of alleviating anxiety associated psychological or environmental stressors, including audiological events. In individuals with misophonia a physiological reflex has been observed (tensing of clenched/tightened muscles; sweaty palms) that often precedes escape behavior or other aggressive or inappropriate coping responses (e.g. impulsive actions such as mimicking the offending noise, aggressive acts such as pushing, quickly leaving the environment). In contrast to ticks in Tourette's Syndrome, relief from the misophonic somatic nervous system stress response typically occurs upon the discontinuation or escape from the trigger sound. In addition, in individuals with misophonia, the distress trigger is specific to certain sounds produced by humans and is accompanied by disgust and anger to a much higher degree than is found with vocal and motor tics (Schröder et al., 2013). The most salient difference between the two conditions is that patients with misophonia typically only experience their misophonic response in the presence of the aversive sounds, and they experience relief when they can escape these sounds. In Tourette syndrome, tics can occur in the absence of any external stimulus (Neal & Cavanna, 2013).

Differential diagnosis with psychiatric disorders. Patients with misophonia exhibit symptoms that overlap with a number of other psychiatric disorders currently listed in the DSM-5 (American Psychiatric Association, 2013) and the ICD-10 (World Health Organization, 1992). These include specific phobia, post-traumatic stress disorder (PTSD), social phobia and obsessive-compulsive disorder (OCD).

CBT TREATMENT OF MISOPHONIA CASE

Misophonia resembles specific phobia in that the patient has a strong negative emotional reaction to a specific external stimulus (Schröder et al., 2013). Clients with specific phobia may also have strong autonomic reactions to specific sounds, which may lead the individual to avoid situations where they fear that they will encounter these sounds. However, there are several distinctions between the two diagnoses. First, in specific phobia, the primary emotion driving avoidance of the stimulus is fear. Individuals with misophonia may have fear about encountering trigger sounds, but this is typically secondary to an emotions of disgust and anger as well as autonomic distress (American Psychiatric Association, 2013). Second, for individuals within specific phobia, both auditory and non-auditory features of the feared item, situation, or activity can trigger the anxiety and fear response. For example, individual with a fear of flying may have a phobic response when hearing planes near an airport, but they might also have the anxiety response when they see a plane, walk into the airport, or imagine sitting in a plane. Misophonic triggers are most typically sounds that come from a specific source (other humans), and the aversive response to sounds typically does not generalize to any other characteristics.

In some people with PTSD, exposure to certain sounds that are associated with their traumatic experience may result in intense negative emotions (including anxiety, panic, and even aggression), physical hyper-arousal, and avoidance (Resick, Uhlmansiek, Clum, & Galovski, 2008). Phenomenologically, these PTSD symptoms may present similarly to a misophonic reaction, especially if the PTSD responds to trigger cues with anger. However, the DSM-5 diagnosis of PTSD requires direct or indirect exposure to a traumatizing event that represents an existential threat. Misophonic reactions are not typically associated with a threat of death or danger to safety (American Psychiatric Association, 2013). Misophonic triggers often produce emotions of anger or disgust and assumptions about the malicious intent of the perpetrator

CBT TREATMENT OF MISOPHONIA CASE

(Kuehn, 2015). In addition, Criterion B for PTSD in the DSM-5 requires episodes where the individuals “re-experiences” the traumatic event (American Psychiatric Association, 2013). Like those with PTSD, misophonic patients can be flooded with negative emotions, and exposure to trigger sounds can result in a trauma response. However, misophonia is not necessarily associated with a traumatic event. In PTSD, triggers re-experiencing trauma can have a variety of sources, including internal sensations or cues (Chard, 2005); in misophonia, the triggers are exclusively auditory. It is not clear whether individuals with misophonia would describe their emotional responses as a “re-experiencing event.” The highly contextual and social nature of triggers suggests that the misophonic response is typically directly tied to stimuli and interpretation of information in the present environment (Schröder et al., 2017).

People with misophonia often present similarly to those diagnosed with social phobia (American Psychiatric Association, 2013; Schröder et al., 2013). In both social phobia and misophonia, patients may avoid situations where they may encounter a stimulus and suffers from either disorder may be afraid of others’ negative judgments of their behavioral reactions. In misophonia, fear of negative appraisal by peers is typically secondary to their fear of encountering misophonic triggers.

OCD and misophonia may present similarly due to a preoccupation with specific stimuli (American Psychiatric Association, 2013; Schröder et al., 2013). With misophonia, the stimuli (us) are specific trigger sounds, while in OCD; this pre-occupation takes the form of obsessional thoughts, urges, and impulses that can be related to a wide range of internal or external stimuli. For individuals with OCD, intrusive obsessional thoughts can elicit a range of negative emotions, including disgust and anger, but anxiety and fear are the most common emotional responses. In OCD, intrusive thoughts are typically followed by compulsive rituals (repetitive behaviors or

CBT TREATMENT OF MISOPHONIA CASE

mental acts) that serve to ameliorate the negative emotion (most commonly anxiety) and escape from distress (Abramowitz & Jacoby, 2014). People with misophonia typically do not engage in compulsive or ritualistic behaviors, and their experience relief from their distress by leaving the trigger sound (Edelstein et al., 2013).

Comorbid Psychiatric Diagnoses. Edelstein and Rouw (2013) examined the largest and most diverse sample of people with misophonia in the peer-review literature. They recruited 301 participants reaching out to known treatment centers and online support groups. The participants represented 36 countries, were predominantly female (83%), and had a mean age of 37 (SD = 14 years). When interviewed about comorbid conditions or diagnoses, 50% reported none. In the other 50%, the most commonly reported conditions were tinnitus (12%), PTSD (12%), and ADHD (12%). These were followed by eating disorders (8%), obsessive-compulsive disorder (8%), selective mutism (6%), and hyperacusis (4%). Other conditions include “anxiety/panic/phobic conditions” (13%) and “depression/depressive disorders” (13%). While few participants reported having problematic substance use disorders, 36% reported that they had occasionally used alcohol to lessen misophonic symptoms. The researchers noted that the results of this study could have underestimated differences in misophonia by gender since it relied heavily on predominantly female support groups for recruitment.

In summary, the research so far suggests that people with misophonia are at significantly higher risk of co-occurring psychiatric disorders, but about half of patients with misophonia do not have another psychiatric condition. If people with misophonia have a higher risk of other psychiatric illness, it is not clear whether those other disorders develop secondary to misophonic distress. The data support a strong association between misophonia and obsessive-compulsive disorder or impulse disorders (Edelstein et al., 2013; McKay et al., 2017). Based on the high

CBT TREATMENT OF MISOPHONIA CASE

rates of comorbidity and limited research on biological basis of the condition, it appears that while Schröder et al.'s (2013) assertion that misophonia is unique has some merit, it is still premature to conclude that misophonia is categorically distinct from all other disorders. Some of the issues that remain to be addressed are important for establishing misophonia as a category, including the prevalence of the disorder in the general population, patterns of heredity, and mediators of misophonic response.

Theoretical Conceptualization of Misophonia

Misophonia has been examined from a variety of theoretical and disciplinary perspectives, resulting in different models of the disorder. The theoretical conceptualization of the disorder cites specific research on the neurological underpinnings of the disorder as well as drawing on concepts and research from learning theory and the cognitive therapy literature. The models and research are briefly summarized here.

Jastreboff and Jastreboff's Theoretical Model. While there is no known cause of misophonia, the audiological researchers who coined the term "misophonia" put forth a theoretical framework (Jastreboff and Jastreboff, 2001) that is often cited as the model of origin (Brout et al., 2018). The Jastreboffs developed their model of misophonia by extending models that they had previously used to understand and treat tinnitus and hyperacusis. The Jastreboffs (2001) posited that the responses in people with misophonia were the product of biological and neurophysiological vulnerabilities and interactions with the environment. They hypothesized that these neurological vulnerabilities consisted of enhanced connections in the brain between areas associated with auditory system and regions of the limbic system that are implicated in processing of emotion and memory. They hypothesized that the misophonic reaction to trigger sounds was a conditioned response acquired through "associative learning" (M. M. Jastreboff &

CBT TREATMENT OF MISOPHONIA CASE

Jastreboff, 2001). In their model, a somatic nervous system “fight or flight” response associated with increased activation in the limbic system had become “paired” with trigger sounds produced by close friends or family members. Jastreboff and Jastreboff (2001) did not account for the anger or disgust response on a neurophysiological level common to misophonia, but they inferred that “anger” was a byproduct of the sound’s social and environmental context.

Neurological and Emotional Factors. Emerging research on a neurological/emotional basis for misophonia is limited, but preliminary findings support the general framework of the disorder’s functional underpinnings (Brout et al., 2018) put forth by the Jastreboffs (2001). To date, the most comprehensive neurological and physiological profile of people with misophonia was completed by Kumar and colleagues in 2017 (Kumar et al., 2017). In their study, the researchers collected and compared galvanic skin response (GSR), heart rate (HR), and whole-brain structural MRI data between compared 20 people with misophonia with a 22-person control group of people without misophonia (matched by age and sex). Brain activation was recorded for each participant when they were exposed to sets of three sounds: trigger sounds known to evoke a misophonic reaction (such as people eating and breathing), unpleasant sounds perceived to be annoying to people with and without misophonia such as a baby crying or screaming, and neutral sounds such as falling rain. They found that trigger sounds resulted in heightened GSR and HR, and increased activation (i.e. blood-oxygen-level-dependent [BOLD] responses) in the anterior insular cortex (AIC) for misophonia group compared to the controls. At the same time, they found no significant differences between people with misophonia and control subjects in responses to unpleasant or neutral sounds. The AIC is a critical brain region associated with integrating emotions, memory, and autonomic nervous system activity. In addition to the AIC, Kumar and colleagues noted “abnormal functional activity” in the

CBT TREATMENT OF MISOPHONIA CASE

ventromedial prefrontal cortex (vmPFC), hippocampus, and amygdala. This heightened response in the AIC is often associated with increased emotional activation, and disruptions in the vmPFC can affect emotional regulation. The authors acknowledged certain limitations of their research, including individual variability in triggering sounds and the use of arbitrary “unpleasant sounds” (Kumar et al., 2017). Despite these limitations, their findings support the neurological vulnerability central to Jastreboff and Jastreboff’s (2001) model.

While the Kumar et al. (2017) study is the only MRI study of misophonia in the literature, their research builds upon an existing knowledge base. This includes a study by Edelstein and colleagues in 2013 in which participants with misophonia exhibited increased skin conductance response and sympathetic nervous system reactivity in the presence of misophonic trigger sounds compared to controls (Edelstein et al., 2013).

Behavioral and Learning Factors.

Classical conditioning. The “associative learning” that the Jastreboffs (2001) cite as responsible for the emergence, generalization, and maintenance of misophonic symptoms is a concept from classical or Pavlovian conditioning (R. E. Clark, 2004). Classical conditioning is a form of learning that focuses on developing new associations on a reflex level (Cooper, Heron, & Heward, 2007). In classical conditioning, new learning occurs when a neutral stimulus (NS) is paired with (or comes to predict) an unconditioned stimulus (US), thereby becoming a conditioned stimulus (CS). In classical conditioning, this US elicits a reflexive or unconditioned response (UR), and thus with pairing the presence of the CS will elicit this same reflexive response, which is now described as a conditioned response (CR). A critical component in pairing of the CS and US is spatial and temporal proximity (Cooper et al., 2007). In humans, classical conditioning associations often occur on the level of basic brain processing without

CBT TREATMENT OF MISOPHONIA CASE

conscious awareness (Carlson, 2011). According to the Jastreboffs' (2001) model, in misophonia the triggering sound is the CS, which is paired with the US of limbic system excitation and reflexive SMS activation. The UR/CR is some combination of the fight or flight response, anger, irritation, disgust, and anxiety, impulsive behavior, and heightened distress. One behavioral researcher documented the UR as a physiological reflex that can be observed with facial grimacing and muscle contraction in the hand (Dozier & Morrison, 2017).

With repeated exposure to the pairing between conditioned stimulus and conditioned response, sensitization may occur over time. Sensitization is a process in which increased neuronal excitability occurs with repeated exposure to the trigger sounds (Carlson, 2011). This increased excitability is called "kindling" (Carlson, 2011). This kindling process increases the likelihood that the CR will be triggered more easily at lower and lower levels of stimulation. Decreasing the threshold for triggering a response may also have an effect of increasing the ease by which new neutral stimuli (other sounds) become paired with the CS (Carlson, 2011; Palumbo, Alsalman, De Ridder, Song, & Vanneste, 2018)

One variable that increases the likelihood of sensitization is avoiding the trigger sounds or immediately leaving situations where the trigger noise is encountered (Jastreboff & Hazell, 1993; Palumbo et al., 2018). This avoidance behavior limits opportunities for the patient to habituate to the CS. Habituation, which is also referred to as desensitization, is an alternate outcome for repeated exposure to trigger sounds. It is a process in which the repeated exposure to the CS in the absence of the US reduces the strength of this association. Over time, the individual learns that the presentation of the CS does not predict the CR, leading to decreased sensitivity to the CS over time (Carlson, 2011; P. J. Jastreboff & Jastreboff, 2014) and ultimately the extinction of the CR.

Operant conditioning and negative reinforcement. For people with misophonia, functional impairment in daily life is usually the result of avoiding or leaving situations where they hear or anticipate hearing trigger sounds (Edelstein et al., 2013). As with sensitization, these behavioral patterns typically strengthen over time, leading to self-isolation, missed social events, and limited opportunities to explore new environments or visit places that they may enjoy (Bernstein, Angell, & Dehle, 2013). This avoidance behavior is also learned and reinforced through operant conditioning. Operant conditioning, or instrumental conditioning, was introduced by Edward Thorndike in 1911 and popularized by B.F. Skinner in the 1950s and 1960s (Cooper et al., 2007; Fishman, Rego, & Muller, 2011; Hollon & Beck, 2013). In operant conditioning, future behaviors increase when they are followed by a desired outcome (reinforcement) and decrease when followed by an undesired outcome (punishment) (Cooper et al., 2007). In misophonia, avoidance or escape behavior is likely reinforced through a process called negative reinforcement (Webber & Storch, 2015), in which the subject experiences relief when a behavior results in the termination of an aversive situation (Cooper et al., 2007). Patients experience immediate relief from their misophonic reactions when they leave a triggering sound (Edelstein et al., 2013; Palumbo et al., 2018). This feeling of relief is often a powerful reinforcer, and even intermittent escape behavior can have a potent and durable impact on one's willingness to tolerate distress associated trigger sounds.

Cognitive Factors. Cognitive therapy, also referred to as second-wave Cognitive Behavior Therapy, emerged in the 1950s and 1960s (Hollon & Beck, 2013). Cognitive therapy posits that events, situations, or physical sensations do not determine one's behavior or emotional response. Instead, one's interpretation of these sensations and situations drives the response (J. S. Beck, 2011). Aaron Beck, one of the founders of cognitive therapy, described

CBT TREATMENT OF MISOPHONIA CASE

cognitions as existing in a hierarchy of core beliefs, intermediate beliefs (e.g. rules and assumptions) and automatic thoughts (e.g. ideas and images used to understand moment-to-moment experiences) (A. T. Beck, 1967). In Beck's earlier writing on the cognitive therapy model for depression, he described the concept of schemas as the "conceptual framework" that one uses for "screening, coding, and evaluating" their internal sensations, relationships, and interactions with the external environment. Beck described schemas as developing during childhood and remaining "latent" until "activated" by a "precipitating event" (A. T. Beck, Rush, Shaw, & Emery, 1979, p. 16). In extending his earlier work on depression, Beck developed the cognitive information processing model for anxiety (A. T. Beck & Clark, 1997) to account for how schemas, which are informed by one's core beliefs and assumptions, can lead to biased cognitions and errors in the processing of information. An example of these errors in processing information or "distorted thinking" is overestimation of risk that in turn elicits a fight or flight autonomic response (A. T. Beck & Clark, 1997) characteristic of anxiety. In this model, information processing errors occur due to "distorted" schemas can lead to "attentional bias" (focusing on certain information as being important), biased interpretation (automatic thoughts that interpret internal sensation and external stimuli as posing a threat), and the encoding of memories that support these biases and interpretations (A. T. Beck & Clark, 1997).

The information-processing model of cognitive therapy has regularly been applied to understand the role that cognition plays in anger (Brondolo, DiGiuseppe, & Tafrate, 1997; Deffenbacher, 2011; Deffenbacher, Dahlen, Lynch, Morris, & Gowensmith, 2000; Ellis, 2017). Deffenbacher (2011) noted that people who experience anger are more likely to engage in the biases of "overestimating rejection by others," catastrophic thinking, overgeneralization, black and white thinking, and mind reading. Ellis (1977), a contemporary of Beck and the founder of

CBT TREATMENT OF MISOPHONIA CASE

Rational Emotion Behavior Therapy (REBT) noted that cognitive errors might cause a person to interpret stimuli as more provocative than they are in reality. This may lead to a person being more likely to interpret others as acting in ways that are intentionally unfair, disrespectful, and dangerous. This can also lead to overestimating the effectiveness of using aggression to resolve the situations (Brondolo et al., 1997).

Guiding Conceptualization

People with moderate to severe misophonia typically exhibit avoidance and escape behavior in response to the intense autonomic distress and negative emotions of anger, disgust and/or anxiety that occur in the presence of trigger sounds (Edelstein et al., 2013; Schröder et al., 2013; Webber & Storch, 2015). Guided by the Jastreboff and Jastreboff's (2001) conceptual theory of misophonia's etiology and a cognitive behavioral transdiagnostic-theoretical framework, I created the following guiding conceptualization informing my treatment of Zara: The origin of misophonia is hypothesized to stem from a neurological predisposition and cognitive vulnerabilities (errors in interpretation and distortions in processing of information). Precipitating event that leads the development of the misophonic response is the conditioned pairing of a misophonic trigger sound with an aversive somatic nervous system excitation.

The guiding conceptualization is illustrated in Figure 1 with steps followed from left to right. The two factors that are hypothesized to pre-dispose an individual to develop misophonia are neurological and cognitive vulnerabilities. Neurological vulnerabilities for the intense and aversive emotional misophonic reaction appear to be associated with increase excitability in the limbic system and Anterior Insula Cortex (AIC), and disruptions in the prefrontal cortex including the vmPFC. In the guiding conceptualization, activity in the AIC and limbic systems is considered the unconditioned stimulus that triggers an unconditioned aversive physical reflex

CBT TREATMENT OF MISOPHONIA CASE

response of somatic nervous system activation, disruptions in the processing of basic sensory information, emotion and memory, and emotion regulation. The unconditioned stimulus co-occurs with a neutral stimulus (trigger sounds) which leads to the association of the trigger sound with the (newly conditioned) aversive physical reflex. The cognitive vulnerabilities consist of negative schemas that lead to errors in interpretation and distortions in processing of information (i.e. about the internal sensations and assumptions about the individual producing the trigger sounds). These errors in interpretation are hypothesized to result in the irritation, anger, disgust and anxiety emotional response characteristic of misophonia. This aversive emotional and physiological internal state serves as an establishing operation (increasing motivation) for inappropriate and undesired behaviors (e.g. fight, flight or distract response) that are then negatively reinforced by removing or distracting from the trigger sound and internal aversive sensations. These undesired responses serve to confirm the distorted thoughts and beliefs and produce new assumptions and rules (e.g. I'm out of control, I can't cope with the distress, I need to act to protect myself, etc.) and the individual with misophonia developing anxious thoughts that lead to avoidance of future triggers. In this guiding conceptualization, the conditioned aversive, somatic nervous system response is maintained by co-occurrence of the trigger sound (conditioned stimulus) and the unconditioned stimulus (AIC/Limbic system excitation), the inappropriate coping behaviors are maintained by negative reinforcement (i.e. removal or lessening of the aversive physical reflex and the negative emotional reaction), and the anger/disgust response is maintained by biased interpretation of trigger sound and internal sensations.

Treatment Literature

Currently, there are no established and empirically supported psychosocial or pharmacological treatments for misophonia (Frank & McKay, 2018; Muller, Khemlani-Patel, & Neziroglu, 2018). While the first randomized controlled trial intervention study is reported to be underway (Frank & McKay, 2018), the psychological treatment literature primarily consists of case-studies (Bernstein et al., 2013; Dozier, 2015; Johnson et al., 2013; McGuire, Wu, & Storch, 2015; Muller et al., 2018; Neal & Cavanna, 2013; Reid et al., 2016; Schneider & Arch, 2017) and a single large scale intervention (n=90) of a group-based intervention (Schröder et al., 2017). Since 2013, there have been seven treatment studies published in the peer-review literature. Of these six are case studies, four of the cases in addition to the Schröder et al.'s (2017) intervention have used cognitive behavioral techniques. While preliminary, at the current time, cognitive behavior therapy in combination with exposure appears to have the most empirical support in the peer-review treatment literature. The following is a review of the literature evaluating the effectiveness of these cognitive behavior therapy interventions in treating misophonia. Summaries of these studies can be found in Table 1.

Bernstein et al. (2013) reported the first psychotherapeutic case study of a cognitive behavioral intervention for misophonia. As discussed earlier, the case involved a 19-year-old college student who reported an aversion to others' slurping, swallowing, and chewing sounds. She attempted to communicate her distress to others by mimicking their sounds when they occurred. The student reported avoiding many social opportunities in an effort to avoid the trigger sounds. The researchers' assessment procedures included the Structured Clinical Interview for DSM-IV Axis I Disorders, Clinician Version (SCID-5; First, Williams, Karg, & Spitzer, 2016) and normed self-report rating scales, including the Beck Anxiety Inventory (BAI),

CBT TREATMENT OF MISOPHONIA CASE

the Beck Depression Inventory-II (BDI-II), and the Beck Hopelessness Scale (BHS). These baseline assessments revealed subclinical depression, anxiety, and eating disorders, along with a high willingness to accept change. The researchers did not include a misophonia-specific scale. Their treatment plan included “a cognitive component to challenge dysfunctional automatic thoughts; a behavioral component to interrupt maladaptive and avoidant coping strategies and practice helpful ones, and a physiological component to help recalibrate her autonomic reactivity” (Bernstein et al., 2013, p. 4). The intervention relied heavily on common techniques in CBT, such as Socratic questioning, challenging assumptions, homework assignments, and reframing. Treatment consisted of six weekly sessions. By the end of treatment, the client still found chewing noises unpleasant, but they did not impair her social functioning. Her GAF was assessed at 85, and she reported high life satisfaction and good functioning across domains. She maintained these gains at four-month follow-up.

McGuire, Wu, and Storch (2015) reported the cases of two adolescents with misophonia. Like Bernstein et al. (2013), they began with a psycho-educational approach; however, they also developed a recorded trigger hierarchy and gradually increased the patients’ exposure to the triggers. Both adolescents habituated to the trigger sounds with a marked reduction in avoidant, aggressive, and distracting behavior. McGuire and colleagues utilized the three-part Misophonia Questionnaire (Wu et al., 2014) to measure the effectiveness of treatment. They reported that there was a reduction in the Misophonia Total Score (Parts 1 and 2) and the Symptoms Severity Scale score (Part 3) from pre to post treatment in both cases. McGuire et al. (2015) included the patients’ families in their approach, working with them to gradually reduce accommodations they had made for their misophonic children at the same time that the researchers exposed the adolescents to the trigger stimuli.

CBT TREATMENT OF MISOPHONIA CASE

Reid et al. (2017) published a case study involving a 14-year-old girl who exhibited misophonic reactions to pen-clicking, squeaky noises, and throat clearing. She had comorbid OCD, major depressive disorder, specific phobia (needles), and attention deficit hyperactivity disorder (combined type). The patient presented with OCD, so treatment for misophonia was provided within the context of cognitive-behavioral therapy with exposure and response prevention (CBT-Ex/RP). Both misophonia and OCD were conceptualized and treated in a similar manner. Reid et al. (2017) found that 14 sessions of brief CBT-Ex/RP “helped to quickly reduce distress and impairment, especially in the context of exposure-based psychological treatment” (p. 7).

Muller, Khemlani-Patel, and Neziroglu (2018) also used a combination of CBT and Ex/RP to treat a 14-year-old girl with comorbid OCD, depression, and trichotillomania (eyelash pulling). The subject in this case exhibited misophonic reactions triggered by sounds of knives cutting on plates, heavy breathing, chewing during meals, chairs scraping, and crinkling paper. She described subclinical social anxiety symptoms including fear of judgment and embarrassment when taking tests (a fear that was unwarranted given her cognitive gifts and her history of academic success). The client engaged in a number of avoidance behaviors to manage offending sounds, including avoiding her family during meal times, requesting that family members use plastic eating utensils, and frequent requests to be excused from her classes for “breaks.” The researchers did not use any ratings scales or normed outcome measures in the case. Treatment progress was tracked by subjective report from the client and her family. They tracked the frequency of avoidance and psychological and physiological distress that the client exhibited in the presence of trigger sounds.

CBT TREATMENT OF MISOPHONIA CASE

In this case, treatment consisted of weekly or bimonthly individual therapy sessions with intermittent family sessions to update treatment plans and ensure family support. Before treatment began, the client completed a Subjective Units of Distress scale (Wolpe, 1990) and developed a SUDS hierarchy to rank triggering stimuli. During the exposure phase of the treatment, “exposures began with watching video clips of affectively charged material, with varying degrees of volume and duration of viewing periods” (Muller et al., 2018). “Cognitive processing,” which consisted of evaluating and challenging her assumptions and interpretation of the exposure experience, was conducted before and after exposure in an effort to foster the client’s confidence in her ability to manage stress produced by the triggers. Treatment took place over the course of one year. After a few months of treatment, the client’s misophonic reactions both in and out of sessions began to “diminish,” occurring at reduced frequency and intensity. As the frequency and intensity of symptoms declined, the therapist used CBT to help the client manage her generalized anxiety and improve her assertiveness skills. After one year, the client and her family reported marked reductions in reactions to misophonic triggers and improved anxiety management skills.

Schröder et al. (2017) published the results for the first open-trial, large-scale, small-group intervention program for misophonia. This “open-trial” intervention built upon the success of an unpublished pilot study using individual CBT therapy to treat misophonia in seven young adults. Details about those cases were not published, but they implemented group CBT with 90 outpatient clients based on the pilot study (Schröder et al., 2017). Participants were assigned to closed groups of 6-9 members. Sessions were run by therapists, including clinical psychologists, with “extensive experience” in CBT for OCD and related disorders. Sessions were held “every week or every other week” for a total of 8 sessions (Schröder et al., 2017). Schröder and

CBT TREATMENT OF MISOPHONIA CASE

colleagues used their 2013 diagnostic criteria to conceptualize misophonia as having two core symptoms: an over-focus on human sounds and an immediately triggered, negative emotional reaction. They devised a group CBT protocol that addressed these two core symptoms with four techniques. First, they had participants engage in task concentration exercises to help them redirect their attention to non-triggering sounds, starting in a neutral setting and later moving to a setting that triggered their symptoms. Second, counterconditioning was used to create positive associations with misophonic triggers; for example, a pleasant image, video, or music might be paired with the triggering sound. Third, they used stimulus manipulation, which consisted of having participants initiate the sound trigger on a computer at varying intervals and speeds. Finally, the researchers taught relaxation exercises to the participants for when they encountered the misophonic trigger. Schröder et al. (2017) found that at the end of their CBT protocol, misophonia symptoms were significantly reduced in almost half (48%) of participants as measured by the A-MISO-S. In their study, the average A-MISO-S score at baseline was 13.6 (associated with moderate severity of symptoms), and at the end of treatment, the average score on the A-MISO-S was 9.1, associated with “mild” severity of symptoms. Higher misophonia scores at baseline and the presence of disgust as a primary symptom were predictors of positive response to treatment. The study had several important limitations that the researchers acknowledged. These included the lack of a true control group, the psychometric weaknesses of the A-MISO-S as an outcome measure, and the fact that therapists were aware of the treatment goals and treatment predictions. The intervention also lacked session-to-session data collection, measures of functional limitations, and a regular session schedule from group cohort to cohort.

Specific Intervention Components in the Literature

One of the advantages of cognitive behavioral therapy is its adaptability for addressing client-specific needs (Beck, Davis, & Freeman, 2015). This review of the misophonia literature found that many researchers report CBT treatment protocols without clearly explaining them or providing references. As demonstrated by the emerging discipline of implementation science, this lack of clarity obscures the link between research and practice (Leeman, Birken, Powell, Rohweder, & Shea, 2017). Some common techniques reported in the misophonia CBT treatment literature are described below.

Motivational interviewing. Motivational Interviewing (MI) explores uses a nonjudgmental and non-confrontational approach to explore a client's ambivalence to change (Arkowitz, Miller, & Rollnick, 2017). While it borrows heavily from the Rogerian techniques that encourage self-exploration (Rogers, 1986) the goal of treatment is not increased awareness per se. Instead, it is directed at resolving client ambivalence. In MI, the therapist facilitates an interpersonal relationship in order to explore behavior rather than self-awareness. The therapist uses open-ended questions to engage clients in reflecting on a typical day, reporting past attempts at change, anticipating future change, and evaluating confidence to implement new behavior. In this way, the therapist shapes behavior toward the client's self-defined goals (Rosengren, 2009). Frank and McKay (2017) incorporated MI into their treatment of misophonia as part of their inhibitory learning model.

Cognitive Restructuring. Maladaptive schemas have been found to play an integral role in the development and maintenance of symptoms in a range of psychological disorders including OCD, depression, anxiety, anger, and psychosis. Cognitive restructuring is a structured, collaborative, technique from the field of cognitive therapy that teaches individuals in

CBT TREATMENT OF MISOPHONIA CASE

distress how to change their maladaptive schemas by identifying evaluating, and modifying distorted thoughts, attitude, beliefs, and assumptions that they have about themselves, their inner personal world, the future, achievement, and their relationships with others (D. A. Clark, 2014; Hollon & Beck, 2013). The technique was originally developed by Aaron Beck in his second treatment manual for anxiety disorders (D. A. Clark, 2014). Cognitive restructuring interventions typically include *verbal interventions* (“evidence-gathering, cost/benefit analysis, identifying cognitive errors, and generating alternative explanations”) and *empirical hypothesis testing* (behavioral experiments to test one’s thoughts) (D. A. Clark, 2014). Common techniques used in cognitive restructuring include monitoring of automatic thoughts, identifying patterns of distorted thinking and reframing or challenging of one’s negative thoughts and beliefs. Core cognitive restructuring techniques include Socratic questioning to challenge distorted thoughts and “downward arrow questions” to identify intermediate and core beliefs that underlie an automatic thought (J. S. Beck, 2011).

Exposure and Response Prevention. Exposure and Response Prevention (Ex/RP) is based the two-factor model of avoidance that is based in classical and operant conditioning (Foa, Yadin, & Lichner, 2012; Yadin, Foa, & Lichner, 2012). Ex/RP is a core component of the gold standard CBT treatment for OCD. In Ex/RP, the therapist identifies the intrusive thoughts, emotions, and bodily arousal that accompany a distress-inducing stimulus. Next, the therapist works with the client to break avoidant behavioral patterns. This typically takes the form of gradually exposing the patient to the fear-inducing stimuli until the fear is managed without avoidance rituals. There are three types of exposure in Ex/RP (Kaczurkin & Foa, 2015). “In vivo” exposure involves exposing the client to actual fear-inducing situations; someone who fears public speaking may be asked to give a speech to a small group of people. “Imaginal”

CBT TREATMENT OF MISOPHONIA CASE

exposure, or asking a client to imagine a situation that concerns them, is most helpful for clients with anxiety-provoking thoughts and memories “Interceptive” exposure can be used to help with bodily symptoms of anxiety, such as increased heart rate and shortness of breath (Deacon, Lickel, Farrell, Kemp, & Hipol, 2013).

There are several Ex/RP models, and they differ in approach. Three of the most common are behavioral experimentation, habituation and learning new associations, and inhibitory learning (Arch & Abramowitz, 2018; Foa & McLean, 2016). In behavioral experimentation, the therapist solicits the client’s assistance in carrying out an experiment to determine if an anxiety-producing stimulus has the anticipated negative effect. For example, if a client fears that having thoughts about hurting someone will result in a person being harmed, the therapist might ask the clients to hold a fist to a picture of the person and then describe the harm they actually caused. Habituation is confronting anxiety by participating in repeated exposure to an unconditioned stimulus (Foa & McLean, 2016; Yadin et al., 2012). Using this approach, a person with a fear of insects is repeatedly presented with pictures, models, or actual insects. Habituation should occur during exposure to a stimulus that previously evoked anxiety, and repetition of the same exposure over time would continue to elicit lower levels of anxiety. Finally, inhibitory learning strategies are used to condition new and often neutral responses to stimuli that had previously provoked high levels of fear. In their treatment protocol for misophonia, Frank and McKay (2018) used a number of inhibitory strategies. These included expectancy violation (e.g., pairing the stimulus with odd, ridiculous, or humorous responses), removal of safety signals (e.g., task concentration exercises), and stimulus variability (e.g., proceeding through tasks nonlinearly) during exposure.

CBT TREATMENT OF MISOPHONIA CASE

Mindfulness. As a therapeutic technique, mindfulness is present-centered, non-evaluative awareness of one's thoughts, emotions, and other experiences in the moment they occur (Kabat-Zinn, 1992). High levels of stress have deleterious effects on the nervous system that in turn affect quality of life (Baer, 2006), and mindfulness can disrupt ruminative thoughts about events that activate chronic stress. Mindfulness training involves two basic components: attentional awareness and perspective shifting (Bishop et al., 2004). Attentional awareness is the ability to focus on present experience by inhibiting elaborative processing. Perspective shifting is accepting automatic thoughts and reactions without attempts to judge, evaluate, or change them. Mindfulness has become a primary component of a number of other interventions, including Mindfulness Based Stress Reduction (MBSR), Mindfulness Based Cognitive Therapy (MBCT), and Dialectical Behavioral Therapy (DBT) (Gu, Strauss, Bond, & Cavanagh, 2015; Linehan, 1993). Schneider and Arch (2015) incorporated aspects of mindfulness, including thought acceptance, opposite action, and "non-judgmentalism" in their misophonia treatment case study.

CHAPTER IV

Assessment of the Client's Presenting Problems, History of Presenting Problems, Goals and Strengths

Presenting Problems

Zara presented for treatment to address self-diagnosed symptoms of misophonia, which she described as first emerging at age 14. Zara's symptoms included intense and "overwhelming" feelings of anger, disgust, and anxiety, impulsive verbal and physical aggressive urges, and physiological distress in the presence of other persons who produced the mouth-generated sounds of slurping, chewing of crunchy foods, lip smacking, and teeth picking.

Zara provided a detailed account of her thoughts, emotions, physiological experiences, and behaviors during a typical misophonic experience. She reported that when she encountered one of the "trigger sounds" sounds, she initially felt "disgusted," which she described as "similar to nails on a chalkboard" or "eating a lemon." She described this feeling of "disgust" as a physiological experience that resulted in a behavioral reaction, which she modeled for me by puckering her lips, furrowing her eyebrows, and tensing her forehead. She said that she felt "intense discomfort" when she encountered these sounds, followed by feelings of "anger" and an impulsive urge to yell at or become physically aggressive towards the producer of the sounds. She noted that she felt most intense and overwhelming negative emotions when the producer of the sound was a friend or family member who "knew that she didn't like these sounds." In addition, she described feeling pressure in her ear canal and having a fear that her ear canal might explode if she did not escape. Zara stated that she sought treatment due to a combination of her intense physical discomfort, fears about her own safety, and her concern that she felt "out of control" and might "embarrass" herself by saying something that she later regretted or

CBT TREATMENT OF MISOPHONIA CASE

harming a friend. She was also concerned about her frequent avoidance of situations where she might encounter the trigger sounds. When describing these concerns Zara noted that “before college” there were “a couple” of instances where she had become physically aggressive with close friends and family members. She recalled one incident where she pushed a friend in the abdomen and another example where she injured her older sister by knocking her off the sofa onto the floor. In one instance, she had caused herself to bleed by digging a fingernail into her hand while hearing an offending noise. She reported her worst-case scenario as, “other people will think I’m mean or weird and I won’t have any friends.”

Zara noted that her misophonic symptoms interfered significantly with her daily functioning and quality of life. She reported that she increasingly avoided situations where she anticipated trigger sounds, and she immediately left environments upon hearing a trigger. She reported that her efforts to avoid or escape these sounds had led her to withdraw socially, avoid eating with peers, avoid the campus building where the cafeteria was located, decline invitations to join her friends on trips to restaurants and other outings, and immediately leave her dorm room when friends entered the common area with snacks. Zara reported concerns that she had recently begun to avoid escalators, elevators, and other environments where she feared that she would not be able to escape an offending sound. She stated that she was seeking treatment because she “was sick of not being able to be normal.” She said, “This has been going on for a long time” and she was “finally ready to address it.”

History of Presenting Problems

Zara described herself as “emotionally sensitive” and “easily overwhelmed” as a young child. She reported that she was regularly flooded with anxiety in social situations and would often cry when criticized by peers or family members. She noted that when overwhelmed she

CBT TREATMENT OF MISOPHONIA CASE

would have difficulty focusing, her heart would race, and she would have difficulty calming herself down. Zara attributed her sensitivity to her parents being “critical” of her intelligence and appearance and pressure that she felt to not draw attention to herself as the “outsider” (a reference to her frequent moves as a child). She noted that following another move during the middle of 4th grade, where had developed close friendships and felt uprooted, that she began to respond to her parent’s criticism with irritation, frustration and anger rather than anxiety. She noted that she would regularly respond to their requests with an “attitude” and “hostility.”

Zara’s first awareness of misophonia can be traced back to a specific interaction with her mother when she was 14 years old. Zara remembers vividly that her mother was eating a mango and smacking her lips. Zara’s heart began racing and she experienced disgust and irritation, which intensified as her mother continued to eat. She asked her mother to stop making the sound and her mother proceeded to exaggerate the noise. Zara experienced “overwhelming” feelings of anger each time she heard her mother’s lips smack. After leaving the room, she immediately calmed and no longer felt anger or disgust.

After this incident with her mother, Zara began to notice that she had a similar reaction when she heard her sister smacking her lips. She noted that she would “yell” at her sister to stop and that she felt “out of control.” Zara approached her mother and father about her symptoms to request that they allow her to eat apart from the family. Her request was declined, and following her inquiry, her father would regularly engage in exaggerated chewing sounds when eating. She noted that he smiled and “made it clear” that he was doing this behavior on purpose. She was not clear when she began to develop reactions to other trigger sounds, which included chewing crunchy food such as chips, tooth picking, and slurping. Zara noted that her anger and disgust were most intense when she was with a friend or family member who “knew that I didn’t like

CBT TREATMENT OF MISOPHONIA CASE

these sounds.” She reported that she continues to feel the most intense reaction when around friends and family, but that she is now triggered by “anyone who makes the noises.”

Relevant Background Information

Zara indicated that she was the product of a healthy pregnancy and delivery. She believed that she met her developmental milestones (i.e., walking, crawling, language, social, toileting) within an appropriate age range. She reported no medical issues and stated that she had recently completed a physical exam in which her doctor found no visible anatomical issues in her ear canal. She reported no past medical problems, and she had never lost consciousness or experienced head trauma. She reported limited alcohol consumption, no substance use, and no diagnosed or suspected medical or psychiatric issues in her family. Zara reported that in her home culture, mental health treatment was stigmatized. She was taught that only people who are “crazy” see mental health providers. She had never seen a mental professional prior to the intake and noted that her parents had “teased” her when she complained of her misophonic symptoms. She denied any suicidal or homicidal ideation, and she had no past suicide attempts.

She described herself as coming from an upper-class household. Zara was a middle child, with her parents and her extended family (other than her sister) living in her home country. Her parents were college professors who held doctoral degrees. She moved frequently as a child, living in 5 countries in three continents, due to her parents’ work. On two occasions, she and her siblings lived with their mother while their father took a position in a different location. She reported that the 2.5 years at her current university was one of the longest periods that she had lived in one place since elementary school. She noted that when in her home country she felt safe despite the ongoing violent civil war.

CBT TREATMENT OF MISOPHONIA CASE

Presentation at the Beginning of Therapy

Zara was a young woman who was approximately 5'6" tall and of average weight. She came to the intake session in casual Western clothing (white blouse and blue jeans). She had long braided hair pulled into a ponytail, and she spoke with an American accent. She described English as her primary language, but she was also fluent in German and French. She had a cooperative attitude, demonstrated the full range of affect, and was oriented to time, person and place. She appeared anxious during the intake, engaging in inconsistent eye contact and looking away from me when speaking. She often shifted in her seat and picked at her nails. I established rapport slowly during the intake, and Zara appeared less fidgety with more appropriate eye contact toward the end of this first meeting.

Diagnosis

I completed the diagnostic assessment over two sessions, including the counseling center intake interview, the Structured Clinical Interview for DSM-5 – Clinical Version (First & Williams, 2016), and select questions from a non-standardized misophonia history questionnaire for patients (a questionnaire designed by the Misophonia Treatment Institute). I also administered the three rating scales (A-MISO-S, MQ, and CCAPS-62).

Misophonia is not recognized in either the DSM-5 (American Psychiatric Association, 2013) or the ICD-10 (World Health Organization, 1992). Instead, I used the diagnostic criteria developed by Schröder et al. (2013) in this case. At the onset of treatment, Zara partially (A) or fully (B-F) met each of the six Schröder et al.'s (2013) diagnostic criteria (A to F). The criteria are listed below:

Criterion A. For Zara, the presence or anticipation of multiple specific sounds produced by a human being (e.g. slurping, chewing, tooth picking, and lip smacking) provoked an impulsive aversive physical reaction that typically started with irritation or disgust. Zara reported that she often became frustrated at the person producing the sound. She did not fully meet criterion (A), because her anger or rage was not typically “instantaneous” unless she had a history with the perpetrator, such as with her sister or mother, where she “knew” that they were “doing it on purpose.”

Criterion B. Zara reported feeling a sense of helplessness and a lack of impulse control when triggered. She noted that she had made aggressive comments to friends and family member that she later regretted. She also reported two physically aggressive acts, including injuring her sister by knocking her onto the floor. Her lack of control and fears of embarrassment if she “acted out” were strong contributors to her avoidance.

Criterion C. Zara recognized that her anger and disgust were excessive and out of proportion to the “provoking stressor.”

Criterion D. Zara avoided situations where she anticipated encountering one of her trigger sounds, including the cafeteria, dinners with friends, and her dorm suite.

Criterion E. Zara described anger, disgust, and autonomic symptoms as causing her distress and interfering with her ability to meet new people, hang out with friends, and date.

Criterion F. Zara’s symptoms were not explained by another disorder.

The information Zara reported during the clinical interview that supported her diagnosis was consistent with her scores on the self-reported misophonia ratings scales, the A-MISO-S and the MQ. On the A-MISO-S (Schröder et al., 2013) that she completed prior to the second intake

CBT TREATMENT OF MISOPHONIA CASE

session, Zara's responses added up to 23 out of 24 total possible points. Her score placed her in the "Extreme" Symptom range. On the Severity of Sound Sensitivity Scale of the Misophonia Questionnaire (Wu et al., 2014), Zara indicated that she experienced "severe sound sensitivity" with "sound sensitivities that are so crippling to me, interfering so that daily activity is 'an active struggle.'" On the Counseling Center Assessment of Psychological Symptoms-62 (CCAPS-62), Zara presented with scores on the Generalized Anxiety (73), Social Anxiety (64) and Hostility (62) that were at least one standard deviation above the mean ($M=50$, $SD=10$) (there are no cut-off scores for the CCAPS-62) (Locke et al., 2011).

Zara did not meet diagnostic criteria for any Axis I or Axis II disorders in the DSM-V. She met partial criteria for Social Anxiety Disorder; however, her avoidance symptoms and social fears were secondary to her feelings of helplessness and a lack of control when exposed to sound triggers. She noted that she feared "losing control" and being humiliated or embarrassed by engaging in aggressive behavior or language. Again, her avoidance and fear of social situations seemed to be related to negative evaluation by peers due to her misophonic responses.

I requested that Zara receive an audiological exam prior to the start of treatment, and I repeated my request during each of the first three meetings. Zara never completed an audiological exam, so I was not able to rule out a medical, neurological, audiological cause of her symptoms.

Strengths

Zara presented with many strengths that made her a strong candidate for therapy. She was self-referred for treatment and expressed a sense of urgency to address her misophonic symptoms. She came into therapy having done research on misophonia, which allowed me to spend less time on psycho-education. Given the stigma of mental illness in her family and in her

CBT TREATMENT OF MISOPHONIA CASE

home country in West Africa, her decision to seek therapy reflected the culmination of a long journey and a feeling of being “ready to get down to work” when she arrived at her first session. Zara was articulate, with above average expressive language skills, and she also possessed a healthy intellectual curiosity and desire to learn about her mental health. She described having close relationships with roommates and spoke daily with her sister, whom she described as her best friend. Outside of her misophonia and misophonia-related avoidance, she was high functioning. She maintained good hygiene, was physically healthy, ate regular and well-balanced meals, and had a consistent sleep schedule. She was also a strong student with good organization and time management skills. Her high executive functioning skills, in combination with her motivation to change, were helpful in allowing her to regularly complete homework for therapy.

CHAPTER V

Case Formulation and Treatment Plan

Case Formulation

The origins of Zara's misophonia symptoms are hypothesized to stem from a neurological predisposition and cognitive vulnerabilities that were activated when her mother's lip smacking was paired with an aversive somatic nervous system response through classical conditioning. The onset of Zara's symptoms appeared to be a good fit with the conceptual model for the origin of misophonia described in Jastreboffs' model (Brout et al., 2018; P. J. Jastreboff & Jastreboff, 2000; Palumbo et al., 2018). There was no functional brain imaging completed to evaluate whether she presented with neurological vulnerabilities (increased activity in the limbic system and AIC, and disruptions in the vmPFC) similar to those described in the literature (Kumar et al., 2017). Despite this limitation, there is some evidence that heightened limbic system activation and a neurological pre-disposition was present during childhood. This evidence includes her general sensitivity to sounds and challenges with emotional reactivity, emotional and physiological dysregulation and difficulty calming herself, and anger towards her parents. Following the guiding conceptualization, the limbic system activation (the unconditioned stimulus) co-occurs with the trigger sound (the trigger sound of her mother's lip smacking) producing the conditioned aversive somatic nervous system response. During this first experience with her mother, the repeated presentation of the trigger sounds sensitized Zara to these sounds, which strengthened the conditioned response, which then generalized to other individuals (her father and sister) and then other eating sounds.

I hypothesized that Zara's history of being "frequently" criticized by her parents regarding her appearance and intelligence and her experience of having her needs dismissed or

CBT TREATMENT OF MISOPHONIA CASE

not prioritized contributed to cognitive vulnerabilities that pre-disposed her to develop a misophonic response. Her belief that her parents did not respect her or that they treated her unfairly is hypothesized to have resulted in a hyper-vigilance and sensitivity to criticism that contributed to her biased interpretation of their production of trigger sounds as intentional and aggressive. Some of these assumptions and beliefs include that others perpetrating trigger sounds have malicious intent or are responsible for her misophonic response, that she is defective and not able to cope effectively with the sounds, and that exposure to triggers will result in loss of control with potential embarrassment or harm to self or others (behavior such as verbal or physical aggression, physical harm to self, or other socially inappropriate coping).

It is hypothesized that Zara's inappropriate coping responses, including her escape behavior, sticking her fingers in her ears, playing music, and aggressive language and behavior were caused and maintained by the removal or diminishment of the trigger sound which negatively reinforced these behaviors. Lastly, Zara's avoidance behavior was hypothesized to be caused by her assumptions and beliefs about her inability to tolerate the trigger sounds and anxiety about catastrophic outcomes that may occur if she encountered the trigger sounds.

Developing the Treatment Plan

In the absence of empirically-supported treatments for misophonia, I utilized Jacqueline Persons's case-formulation approach for developing individualized and evidence-based cognitive behavioral treatment plans (Persons, 1989, 2008). Persons' case-formulation model is a transdiagnostic approach to assessment and treatment that focuses on underlying mechanisms of psychological problems and treating at the symptoms level (Mansell, Harvey, Watkins, & Shafran, 2009, p. 11; Persons, 2008). Persons' approach is designed for the "real world" where clients do not fit neatly into diagnostic categories. This makes it an excellent fit for conditions

CBT TREATMENT OF MISOPHONIA CASE

such as misophonia. Her approach mirrors the structure of this case study. It begins with the development of a case conceptualization that is guided by theory from the cognitive and behavioral literature and research on biological vulnerabilities. The theoretical case conceptualization is then integrated with information about the patient that is collected during a thorough assessment to yield the case formulation (i.e. hypotheses regarding on the origins, precipitants and factors maintain the symptoms). The treatment plan is then developed by adapting EST or selecting components from EST that have been demonstrated to be effective in targeting and disrupt these hypothesized mechanisms of the symptoms. Persons (2008) described the evidence-based, cognitive-behavioral (CB) case formulation approach as an “empirical hypothesis testing approach to clinical work” where assessment, formulation, and intervention operate in a feedback loop.

As discussed in the case formulation, the forces that maintained Zara’s symptoms included her conditioned aversive somatic nervous system response, negative reinforcement of inappropriate coping behavior, and errors in her interpretation of information stemming from “misappraisals” and negative and inaccurate assumptions and beliefs. I developed the treatment plan to address these factors with intervention components derived from the misophonia case-study literature and the broader empirically supported treatment literature. As discussed in the “Treatment Literature” section there is a growing case study literature showing that cognitive behavioral interventions (and cognitive restructuring in particular) in combination with exposure therapy can be effective in the treatment of misophonia (Bernstein et al., 2013; McGuire et al., 2015; Muller et al., 2018; Reid et al., 2016; Schröder et al., 2017). Selective attention, mindfulness, and relaxation exercises were also common techniques in these case studies (Schneider & Arch, 2017; Schröder et al., 2017).

CBT TREATMENT OF MISOPHONIA CASE

The treatment plan was guided by Zara's case formulation and accounts of these interventions from the treatment literature. I selected cognitive restructuring (CR) as a treatment component to help Zara change her negative thinking, cognitive misappraisals, and negative assumptions and beliefs. Cognitive restructuring works by changing one's maladaptive schemas and errors in processing of information. A mediation analysis of therapy process has shown that changing in one's schemas cognitive and restructuring of negative automatic thoughts has led to symptom reduction in OCD, social anxiety disorder, PTSD, and depression (D. A. Clark, 2014). Prior to treatment Zara described responding to trigger sounds "immediately" and "feeling out of control." From a cognitive therapy perspective, I conceptualized reactivity and negative emotional and behavioral response as the result of her "instant misappraisal" that were informed by her maladaptive assumptions and beliefs. I anticipated that as Zara became more skilled at monitoring her automatic thoughts, identifying thinking traps and biased thinking and testing/challenging her thoughts and assumptions that she would feel less angry, disgust and overall distress when presented with a trigger sound. My cognitive restructuring intervention was guided by the protocol for cognitive restructuring outlined by David Clark (2014) and utilizing techniques and worksheets from the Judith Beck (1999) *Cognitive Therapy: Basics and Beyond* text. In addition to their texts, Cognitive restructuring has been cited specifically in many of the case studies in the treatment literature for misophonia (Bernstein et al., 2013; Brout et al., 2018; McGuire et al., 2015; Schröder et al., 2017).

I selected graded exposure with response prevention as a treatment component for several reasons. First, I sought to desensitize Zara to the trigger sound. Based on her case formulation, Zara's initial aversive somatic nervous system response is conceptualized as a conditioned response that has been paired with the trigger sound. This conditioned response occurs due to

CBT TREATMENT OF MISOPHONIA CASE

poor discrimination between the unconditioned stimulus (limbic system activation) and the trigger sounds. By completing repeated and prolonged exposures to trigger sounds, I anticipated that Zara would become desensitized to the trigger sound and more effectively discriminate between the CS and the US, leading the CR to undergo extinction. This over time would lead to a reduction in her sensitivity and physiological distress when encountering triggers. I anticipated that exposure with response prevention would also lead to a reduction in her use of undesired coping behaviors. These behaviors were hypothesized to be maintained by negative reinforcement (the removal of her internal distress). Thus, by utilizing alternative coping strategies of relaxation and breathing exercises as well as well as showing Zara that her distress levels will naturally reduce over time, I hypothesized that these undesired coping strategies would no longer be reinforced and undergo extinction. In addition to these behavioral outcomes, I also wanted to use exposure to allow Zara to conduct behavioral experiments to test and challenge her assumptions and beliefs. The exposure exercises were guided by the exposure and response prevention protocol in the Abramowitz & Jacoby (2014) text with insight from the case exposure components described in Reid et al. (2016) and McGuire et al. (2017).

I used mindfulness strategies as a transdiagnostic treatment component to help Zara increase her effectiveness in using cognitive restructuring techniques, focus her attention, and increase her tolerance of the distress that she experienced in the presence of triggers. These techniques were selected to decreasing negative thoughts and impulsive coping responses through increasing Zara's awareness of her body, thoughts, and emotions and experiencing them without self-criticism and reactivity ("I need to do something"); increasing her sense of control by strengthening her ability to redirect her focus of her attention; and helping her to engage with and view her thoughts and emotions as temporary and tolerable.

CBT TREATMENT OF MISOPHONIA CASE

I also included motivational interviewing (MI) techniques in the treatment plan. I used motivational interviewing to help raise Zara's awareness of the costs and benefits of addressing her misophonic symptoms. I also wanted to collaboratively identify meaningful and achievable goals in patient-centered language (e.g. "I just want to be normal and like my friends"). For Zara, I expected that Motivational Interviewing techniques would increase her discomfort with not making change, cultivate willingness and readiness to change, increase motivation to implement the treatment plan and increase her collaboration and trust with me by establishing the therapist as non-judgmental and "on her side" for reaching goals.

While we initially sought to replicate the cognitive restructuring and exposure procedures from the case study literature and the Schröder et al. (2017) study, we ultimately decided to base our interventions on components from other evidence-based CBT interventions and manuals. We decided this for several reasons. This includes a lack of sufficient detail to replicate other studies' models, the absence of outcome data in several of the studies that limited empirical support for the techniques, methodological limitations (inconsistent number of sessions across participants in cases, limited experimental control), and issues of overall feasibility. I decided to use David Clark's (2014) protocol and Judith Beck's *Cognitive Therapy: Basic and Beyond* (1999) text for cognitive restructuring and Abramowitz & Jacoby (2014) treatment guide for OCD. These treatment guides were selected due to my familiarity with the manuals and texts. I decided to select an OCD intervention for the Ex/RP, since Ex/RP is the gold standard treatment for OCD and as Schröder et al. (2013) referenced in his seminal article on misophonia, OCD and misophonia share many similarities including "course of illness, patient population, treatment response and neuro-circuitry" (Schröder et al., 2013, p. 4).

CBT TREATMENT OF MISOPHONIA CASE

Phases of Treatment

Zara's treatment was structured with five phases:

Phase I: Setting the Stage: Initial assessment, establishing rapport and psycho-education, and treatment goals.

Phase II: Cognitive Restructuring: Learn cognitive restructuring skills.

Phase III: Building Upon What Works, Mindfulness, Relaxation and Prepping for Exposure: Review current effective coping strategies, practice problem solving approach, practice mindfulness techniques, practice relation technique, SUDS hierarchy and Prep for Exposure.

Phase IV: Graded Exposure Session: Exposure with response prevention that includes imaginal, pictorial and in-vivo exposure exercises.

Phase V: Consolidation of Gains, Maintenance Plan and Termination: Review of data and growth in treatment and plan for maintaining gains after treatment ended.

List of Treatment Goals

Three treatment goals in the case were established in collaboration with the client. A global goal for treatment was to decrease overall symptoms of misophonia. Specific goals were 1) Reduce inappropriate coping responses and increase effective coping responses when exposed to triggers; 2) Experience less distress and sensitivity to triggers; and 3) Improve overall functioning, including a reduction in avoidance and social interference and improvement in psychological functioning.

Measures

Measures of Treatment Progress and Outcomes. A variety of quantitative and qualitative data were collected to track and evaluate the effects of therapeutic intervention techniques on Zara's

CBT TREATMENT OF MISOPHONIA CASE

symptoms and functioning. Measures of the effects of specific therapeutic factors were selected to map onto the treatment goals and were used to evaluate hypotheses regarding mechanisms of change in the intervention. Quantitative data were gathered from misophonia-specific rating scales and a standardized measure of psychological functioning. Overall Misophonia symptom and symptom severity was primary measured via regular administration of the self-report measures: the *Amsterdam Misophonia Scale (A-MISO-S)* and *Misophonia Questionnaire (MQ) Total Score and One-Item Severity of Sound Sensitivity* scales.

Goal 1): Reduce inappropriate coping responses and increase effective coping responses when exposed to triggers.

Inappropriate coping emotions and behaviors were monitored quantitatively using the *MQ-Part 2 Misophonia Coping Emotions and Behaviors Scale (MQ-P2)* (See Appendix A-2). Increase in effective coping responses was evaluated based on Zara's self-report, her responses on homework and observations made during exposures.

Goal 2): Experience less distress and sensitivity to triggers.

Sensitivity and distress in response to triggers were measured by monitoring individual items on the MQ and A-MISO-S and by examining changes in her scores on her Subjective Units of Distress (SUDS) Hierarchies. In addition, from the MQ Misophonia Symptoms Scale (MQ-P1), Item 1: "In comparison to other people, I am sensitive to the sound of: People eating (e.g. chewing, swallowing, lips smacking, slurping, etc.)" was used. MQ-P1 is a Likert scale ranging from 0 (Not at all true) to 4 (Always True). An additional item from the MQ that addressed distress on the Misophonia Coping Emotions and Behaviors Scale (MQ-P2), Item 4: "Once you are aware of the sound(s), because of the sound(s), how often do you: Become anxious or distressed." The MQ-P2 is a Likert scale ranging from 0 (Never) to 4 (Always). On the A-MISO-

CBT TREATMENT OF MISOPHONIA CASE

S, I used Item 3 (“How much distress do the misophonic triggers cause you?”) with ratings from 0 (None) to 4 (Extreme, near constant and disturbing anger/disgust). Qualitatively, this was monitored based on Zara’s self-report of sensitivity and distress and observations during sessions.

Goal 3): Improve overall functioning, including a reduction in avoidance and social interference and improvement in psychological functioning.

Avoidance of triggers and interference with social/school/work functioning were monitored by examining the MQ-Part 3 One-Item Severity of Sound Sensitivity (MQ-P3) score (See Appendix A-2), A-MISO-S Question 2 (“How much do these misophonic triggers interfere with your social, work or role functioning?”) and A-MISO-S Question 3 (“Have you been avoiding doing anything, going any place, or being with anyone because of your misophonia?”). The A-MISO-S items were scored on a Likert scale from 0-4 (None to Extreme) with higher scores associated with more impairment. Qualitatively, this was monitored based on Zara’s self-report of avoidance and improvement in her functioning. Her overall psychological functioning as measured by the Counseling Center Assessment of Psychological Symptoms-62 (CCAPS-62) was used as measure to monitor changes in her psychological functioning.

Amsterdam Misophonia Scale (A-MISO-S). The AMISO-S is one of the most widely utilized scales in the misophonia case study and treatment literature (Brout et al., 2018). The scale was developed by Schröder, Vulink, and Denys (2013) in their seminal misophonia article in which the researchers outlined the proposed diagnostic criteria for the disorder. The researchers adapted the scale from the six-item Yale-Brown Obsessive-Compulsive Scale (Y-BOCS; Goodman et al., 1989a; Goodman et al., 1989b). Schröder et al. justified adapting the Y-BOCS by citing similar adaptations used to measure symptom severity in other disorders, such as

CBT TREATMENT OF MISOPHONIA CASE

pathological gambling (PG-YBOCS; Pallanti, DeCaria, Grant, Urpe, & Hollander, 2005) and body dysmorphic disorder (BDD-YBOCS; Phillips, Hollander, Rasmussen, & Aronowitz, 1997). The AMISO-S consists of six items on a four-point scale for a possible total score of 24. The six items include the following areas: time spent managing misophonia; interference with social functioning; level of anger experienced with misophonia; level of resistance against misophonic impulses; level of control over their thoughts and anger, and time spent planning ways to avoid misophonic triggers. Scores from 0–4 are considered subclinical misophonic symptoms, with 5–9 points considered mild; 10–14 moderate; 15–19 severe, and 20–24 extreme.

To date there has been no study validating the measure after it was reported in the literature, and there are currently no norms for deriving standard scores. The scale was used despite these limitations because of its widespread use in peer-review case study literature (Reid et al., 2016; Schneider & Arch, 2017; Schröder et al., 2017). The measure was collected weekly and demonstrated sensitivity to change over the course of the intervention in each of these studies. The scale was also collected due to the fact that several of the individual items matched treatment goals that were set by the client (e.g. reduced avoidance, improved social functioning, “control” over thoughts, and self-control in the face of impulses). The A-MISO-S is presented in Appendix A-1.

Misophonia Questionnaire (MQ). Wu, Lewin, Murphy, and Storch (2014) developed the Misophonia Questionnaire (MQ) a three-part self-report questionnaire that assesses Misophonia Symptoms Scale, Coping Emotions and Behaviors Scale, and Overall Severity of Sound Sensitivity Scale (i.e. Symptom Severity Scale). This scale was included after the clinician completed a review of the literature and found that the MQ had been validated and had

CBT TREATMENT OF MISOPHONIA CASE

strong psychometric properties – features that were lacking in the A-MISO-S. The MQ is presented in Appendix A-2.

The MQ was developed following a comprehensive literature review, with the individual items included in the measure identified by psychologists and psychiatrists with clinical experience with misophonia. The measure was piloted with 483 undergraduate students at a large university in the southeastern United States (Wu, Lewin, Murphy, & Storch, 2014). The measure was then analyzed using exploratory factor analysis, which yielded a three-factor solution. The first section, the Misophonia Symptom Scale, examines the presence of specific sound sensitivities such as eating, tapping, and throat sounds. The second section, the Misophonia Coping Emotions and Behaviors Scale, examines the emotional and behavioral reactions associated with misophonia such as “leaving the environment to a place where the sound(s) cannot be heard anymore” and “become anxious or distressed.” The first two parts are rated on a scale ranging from 0 (not at all true) to 4 (always true). These two sections are summed to create a Misophonia Questionnaire Total score, with possible values ranging from 0 to 68. The third section of the questionnaire, the Misophonia Severity of Sound Sensitivity Scale, was adapted from the NIMH Global Obsessive-Compulsive Scale (NIMH GOCS; Murphy, Pickar & Alterman, 1982) to be specific to misophonia. Respondents rate their sound sensitivity on a scale from 1 to 15, ranging from “minimal” to “very severe,” respectively. A score greater than or equal to 7 indicates clinically “moderate sound sensitivities” that cause “significant interference” with daily activities. This mirrors the clinical cutoff that is used for the NIMH GOCS in populations with obsessive-compulsive disorder (St. Clare, 2003).

Wu et al. (2014) reported that internal consistency on the MQ was $\alpha = .86$ for the Misophonia Symptom Scale, $\alpha = .86$ for the Misophonia Coping Emotions and Behaviors Scale,

CBT TREATMENT OF MISOPHONIA CASE

and $\alpha = .89$ for the MQ Total score (i.e., the combination of the first two sections). A Pearson's product-moment correlation revealed a strong correlation ($r = .50, p < .001$) between the total score and the unique question on the Adult Sensory Questionnaire (ASQ; Kinnealey & Oliver, 2002) that assesses the presence of sound sensitivities, suggesting good convergent validity. To test discriminant validity, a Pearson's product-moment correlation between the MQ Total score was calculated with other sensory sensitivity measured on the ASQ. The MQ Total score possessed small to moderate correlations with the questions on the ASQ unique to visual ($r = .33, p < .001$), olfactory ($r = .28, p < .001$), and tactile sensitivities ($r = .34, p < .001$), each of which were notably smaller than the correlation with sound sensitivities.

Since no standard score conversion tables were published for the MQ, the researcher used the means and standard deviations from the Wu et al. (2014) validation paper to calculate standard scores and percentile ranks for Zara. In Wu et al.'s study of 483 undergraduates the MQ Total (the sum of Parts 1 and 2 of the MQ) had a mean of 19.76 with a standard deviation of 4.53. For Part 3, the Severity of Sound Sensitivity Scale, Wu et al. (2014) reported a mean of 3.68 with a standard deviation of 3.42.

Counseling Center Assessment of Psychological Symptoms-62 (CCAPS-62). Over the past decade, the demand for services at many college counseling centers has outpaced their ability to meet provide services (Dinger, Brittain, & Hutchinson, 2014). As a consequence, counseling centers have looked to ways to increase efficiency while also maintaining or improving the quality of services. The Counseling Center Assessment of Psychological Symptoms-62 (CCAPS-62; Locke et al., 2011) was developed with the aim of efficiently discriminating students who were most in need of services. The CCAPS-62 has eight factor-derived subscales that include Depression, Eating Concerns, Substance Use, Generalized

CBT TREATMENT OF MISOPHONIA CASE

Anxiety, Hostility, Social Anxiety, Family Distress, and Academic Distress. It was developed using a sample of over 11,000) university counseling center clients and cross-validated with a sample of over 10,000 additional students. The demonstrated internal consistency of the subscale scores was in the range of .78 –.92. A of 117 students revealed one-week test-retest reliability to be .78 and .93 for each of the eight subscales. McAleavey et al. (2012) reviewed data from the original development study of the CCAPS-62 (Locke et al., 2011) and ran two additional validation tests. The first was to determine the extent to which subscale scores on the CCAPS-62 differentiated clinical and nonclinical samples of college students and the other to assess the utility of the measure's cut-scores for diagnosis. These results supported the use of the CCAPS-62 as an initial measure of psychological symptoms in college counseling centers, however, the authors noted that the CCAPS-62 was not designed to discriminate psychiatric from non-psychiatric samples. McAleavey et al. (2012) concluded that the high positive predictive power of the CCAPS-62 makes it likely that the measure will produce “many false positives,” but that the low negative predictive power also “should confer a degree of confidence to assessors that if one of the subscales is not elevated, the chance of missing a true diagnosis is limited” (McAleavey et al., 2012).

Measures to Evaluate Non-Specific Therapeutic Factors

A variety of quantitative and qualitative data were collected to evaluate non-specific therapeutic factors that were hypothesized to be moderators of treatment outcomes (Chatoor & Kurpnick, 2001). Non-specific therapeutic factors include elements of the therapy process and the therapeutic relationship that are not directly captured by specific intervention techniques (e.g. cognitive restructuring). In Zara's case, we monitored non-specific factors that included her motivation to participate in treatment, rapport between the therapist and Zara, stigma about

CBT TREATMENT OF MISOPHONIA CASE

seeking therapy, and willingness to try new coping during sessions and between sessions. These factors were directly and indirectly assessed using quantitative data derived from the following information: her attendance and cancelation of appointments, completion of homework, and the number of in-session and between-session exposure exercises completed. Qualitative data were primarily derived from the clinician's therapy notes. This data included verbal and non-verbal indicators of engagement and rapport (e.g. eye contact, body language, intonation), evidence of quality of engagement with between-sessions tasks, and quality/effort of responses on homework data sheets (e.g. thought records).

Analysis Plan

Quantitative. Descriptive statistics (total score, mean, standard deviation and standard error of the mean) were calculated for the A-MISO-S and MQ. For the A-MISO-S descriptive statistics were calculated for the two scores of misophonia symptoms and symptom severity the MQ Total Score (Parts 1 and 2) and the Misophonia Severity of Sound Sensitivity Scale (Part 3). Paired t-tests were also conducted for each scale and subscale to determine statistically significant change from pre-treatment to post treatment, in order to evaluate treatment effectiveness. Given that this was a single-subject case study, calculate the t-scores the mean score for all items of each scale was compared pre to post treatment to determine significant difference. Paired t-tests were also conducted to compare post-treatment to 6-month follow up to examine maintenance of gains over time.

Scores from all rating scales were graphed to provide a visual representation of changes over time. Graphing allows for visual analysis of data to elucidate changes in trend, level, and stability of findings over time. Visual analysis is a core feature of single subject research design and interventions (Lane & Gast, 2014). In addition to this analysis of full rating scales and

CBT TREATMENT OF MISOPHONIA CASE

subscales within these rating scales, the difference scores for single items within the two Misophonia scales were compared pre-post to evaluate changes over time.

Qualitative. Qualitative data was calculated by counting and calculating percentages (e.g. percentage of therapy sessions attended, homework assignments completed). Qualitative information also includes changes in Zara's SUDS rating on items from her SUD hierarchy, pre and post exposures. Qualitative information in the form of quotes from the client and observations by the therapist, both of which are contained in the clinical notes, were reported in conjunction with the quantitative data to provide additional information used to evaluate the hypotheses.

CHAPTER VI

Course of Treatment

Phase I: Setting the Stage

Phase I of Zara's treatment consisted of two intake sessions of 60 and 90 minutes. In Phase I, the objectives included establishing rapport, completing a differential diagnosis, conceptualizing the case, identifying treatment goals, providing psycho-education on misophonia and the cognitive behavioral model, and getting Zara's buy-in for the treatment plan. Consistent with the Pragmatic Case Study Model, the following text provides insight into therapist's clinical experience, impressions, and decision-making process that set the stage for the first therapy session. For additional information on diagnosis, including quantitative and qualitative data used to confirm diagnosis of misophonia, see the "Diagnosis" section above.

Intake Session 1

During the first intake session, I administered the Counseling Center intake interview and the SCID-5-CV to gather background information, reason for referral, and begin a differential diagnosis.

I knew that Zara had self-identified with "misophonia" from her response on the pre-intake form. The standard intake procedure at the counseling center is typically completed in one hour, and it includes the local semi-structured counseling center "psychosocial" interview and the SCID-5-CV for clarity with diagnosis. I had never heard of the term "misophonia" prior to Zara's arrival at the counseling center, so I performed a cursory internet search. I saw that misophonia appeared in magazines and other popular press outlets and that it was not included in the DSM-5. This led me to be skeptical about the accuracy of this self-diagnosis. During the process of completing the initial intake session, I asked Zara for a detailed history of the

CBT TREATMENT OF MISOPHONIA CASE

presenting problem. While she spoke, I made sure to put down my pen, make eye contact, ask open-ended questions, affirm and utilize reflective statements to demonstrate my interest and that I was actively listening.

Upon hearing that seeking treatment for mental health concerns is stigmatized in her cultural background and that she felt a great deal of shame and embarrassment in coming in for treatment, I immediately experienced a strong sense of empathy. I recognized that she had done careful research of her symptoms and only sought help as a last resort. Her detailed description of the origin of the disorder and of a recent experience where she was exposed to triggers supported my conceptualization that she was experiencing real distress in the presence of trigger sounds. At that point, it was not clear to me if her distress and discomfort that she experienced in the presence of trigger sounds were the result of a neurological, audiological or medical disorder. I conceptualized her symptoms of avoidance, aggressive and undesired behavior/language, and escape behaviors as learned repertoires. During the intake, she noted that she had completed a physical less than one year prior to our appointment that had revealed no physical issues in her ear. I recognized that I needed to learn about misophonia in order to determine whether this diagnosis was accurate. I scheduled a second intake appointment and asked her to set up an appointment with an audiologist prior to our next meeting.

I completed the first intake session still unsure whether Zara actually presented with misophonia. She described many of the characteristics that were outlined in my brief internet search of the disorder, but she also described feeling anxiety about being exposed to triggers. She noted in particular that she felt “out of control” when in the presence of triggers. She feared embarrassing herself or acting ways that she found to not be aligned with “who she is,” such as pushing or yelling at others. Her description of “fearing” the triggers and the triggers’ specificity

CBT TREATMENT OF MISOPHONIA CASE

left me with some lingering questions regarding whether she presented with a specific phobia or social anxiety.

Between Intake Sessions 1 and 2

Between the first and second intake appointment, I spoke with my supervisor, a licensed psychologist who is a neuropsychologist with expertise in the underlying brain basis of psychiatric symptom. He was also not familiar with the disorder. Before jumping into the treatment literature, we examined the most salient features of her presentation and developed an initial conceptualization of her symptoms focused on several features of the disorder: the specific nature of the trigger sounds, the contextual elements of the triggers (they only occurred when produced by other persons), the fact that she reacted to the triggers with emotions of anger and disgust, and the ways that her response and sensitivity to the trigger sounds followed a classical conditioning model of generalizing and intensifying over time.

I began to dig into the peer review literature, where I came across Schröder et al.'s (2013) diagnostic criteria, the Misophonia International website (Misophonia International, 2017), the emerging biological and neurophysiological literature on the causes of misophonia (Edelstein et al., 2013), and the Jastreboff hypothesis (Jastreboff & Jastreboff, 2014). I noticed the absence of randomized control studies in the literature. I reviewed three case studies (Bernstein et al., 2013; McGuire et al., 2015; Reid et al., 2016) that led me to select two misophonia outcome measures, A-MISO-S, and MQ, and the Misophonia History Questionnaire (Misophonia Institute, 2017) to administer prior to the second intake session. In vetting the two misophonia outcome measures, I selected the A-MISO-S because of its popularity in the peer-review case-study literature and because it was developed by Schröder et al. (2013), who I thought of as a leading researcher in the study of misophonia. I debated abandoning the A-MISO-S in favor of the MQ once I

CBT TREATMENT OF MISOPHONIA CASE

discovered that it had not been validated. While the MQ had been validated with convergent and divergent validity, a factor analysis, and measures of internal consistency, I decided to use both scales in order to “hedge my bets” and give myself more time to evaluate the scales’ psychometric properties and clinical utility. The research literature on misophonia also reminded me to rule out other audiological disorders (tinnitus and hyperacusis), provided the background for the psycho-education needed for the client in the second intake session, and provided initial support for the use of a CBT intervention with an exposure component in treatment. I began to develop hypotheses about the case conceptualization and a nascent treatment plan. During this process, my supervisor and I reflected on the impact of cultural and racial differences between Zara and I. In particular, we discussed how a power differential existed in the room due to my position as a member of the dominant racial (white) and gender (male) groups as well as my status as an American and the therapist (i.e. the expert). Using Sue’s (2001) multi-dimensional framework for multi-cultural competency, I sought to reflect and gain awareness of biases that I brought to the therapy room as a result of my cultural background. In thinking about the first session and the intake and I realized that I knew very little about Zara’s home country. What I knew was from the limited information that Zara revealed and world history classes in high school and college. I understood that my ignorance had led me to make assumptions and that were informed by my western perspective. One assumption from these first sessions that stood out was my skepticism about the accuracy of her self-diagnosis. My training is in a western medical model mold for assessment and treatment. My skepticism about her diagnosis was in part due to my discomfort with going outside of this mold as well as my reticence to relinquish my role as the “expert.” I had described therapy as a “true collaboration,” but in order for my words to be honest and for Zara to feel empowered in treatment, I recognized that I needed to be

CBT TREATMENT OF MISOPHONIA CASE

authentic, vulnerable and humble myself. I decided to have a conversation with Zara where I shared my background, training, case conceptualization, and treatment plan, but also shared with her that there was no established and research supported intervention. Following Sue's framework for multi-cultural competence, I took additional steps to improve my knowledge about Zara's cultural identity. I watched YouTube video-blogs from young women in her country, read an essay from a leading scholar on gender roles and looked at resources on the World Health Organization's website about mental health services in her home nation. In this process of discovery, I gained a deeper appreciation for the complete lack of mental health services in her home and the long journey that Zara took to come to my office. I concluded that reducing Zara's stigma and providing her with unconditional positive regard and validating were essential to create a foundation of trust for therapy to be successful.

Intake Session 2

My goals during the 90-minute second intake session were to continue to build rapport, rule out other medical and psychiatric disorders, learn more about her misophonia symptoms, develop an initial SUDS Hierarchy for her triggers and identify goals for treatment.

Misophonia Specific Intake Process. Zara completed the A-MISO-S, MQ, and the Misophonia History Questionnaire prior to the session. Her scores on the A-MISO-S fell in "Extreme" range for overall symptoms. She also scored in the "Severe" range on the MQ-P3 (One-Item Severity of Sound Sensitivity Scale) a measure of her sensitivity to triggers and impairment associated with trigger sounds. The Misophonia History Questionnaire is a short free response questionnaire about triggers, her reaction to triggers and the impact of these symptoms on her life. I found this information mostly redundant from the clinical interview. Zara indicated that she had "intended" to make an audiological appointment, but that she was confused by

CBT TREATMENT OF MISOPHONIA CASE

which doctor to go to and how to find them. She described the medical system in the States as different from her home country where she has a relationship with her doctor. She reported that she would go see the doctor if it was “required,” but that she hoped that it was possible for her to skip this step. I noted that in the treatment of psychological conditions, mental health professionals typically seek to rule out medical causes of symptoms prior to beginning therapy. I said that I would be happy to help her make an appointment at student health, but that it was my clinical recommendation that she see an audiologist as soon as possible.

I asked her questions regarding her hearing. Zara reported that she did not have ringing in her ears, nor did she find that she had sensitivity to noises where she experienced soft noises as being loud. I went through the diagnostic criteria provided by Schröder et al. (2013) and she fit all criteria, with some variation on Criteria A (her irritation and disgust did not always “*immediately*” escalate to anger). This information provided me with increased confidence that Zara’s symptoms fit misophonia rather than tinnitus or hyperacusis. While I still wanted for her to officially rule out audiological/medical causes, based on the idiosyncratic nature of her triggers, where the intensity of response varies based on her relationship with the perpetrator of the sound, I began to feel more confident that her presentation fit a diagnosis of misophonia. At this point, I decided that I would sharing what I had learned about research on misophonia. I began the discussion with the caveat that misophonia was not recognized in the DSM-5, that there is no known cause of the condition, and that there is limited research on treatments. I cited findings from Kumar et al. (2013) and Schröder, Vulink, & Denys (2013) and introduced her to Jastreboff’s conceptual model. Zara appeared engaged and excited by this information on the disorder, exhibiting more energy and increased eye contact while I spoke. I introduced her to the core theoretical model of cognitive behavior therapy, focusing on the interactive relationship

CBT TREATMENT OF MISOPHONIA CASE

between one's thoughts, physiological response, affect, and behavior. I explained how her experiences and avoidance over time have strengthened her assumptions about the perpetrator of the sounds ("they are doing this intentionally") and fears about "feeling out of control."

Describing triggers, SUDS, and education about emotions. Given the idiosyncratic nature of her triggers, I decided to focus on developing a detailed list of these trigger sounds, perpetrators and situations/people that she avoided. I introduce Zara to the concept of ranking and comparing the intensity of her symptoms experience. I introduced Zara to the concept of a subjective unit of distress (SUDS) (Wolpe, 1990) using a SUDS thermometer worksheet with ratings that ranged from 0 to 100. I adapted a SUDS anxiety scale, swapping out the terms "anxious" and "anxiety" and swapped in the term "distress." This SUDS thermometer is presented in Appendix B-1. In operationalizing "distress," Zara and I focused on the averseness of physiological sensations that she experienced, the "lack of control" that she felt in terms of her ability to cope in a "socially acceptable manner," the intensity of her anger/disgust, the fear that she had about embarrassment or harming herself or others, and "How much I want to avoid them [the trigger sounds]."

I saw the development of this list as important for several reasons. First, I wanted to better understand her symptoms and the triggering stimuli. Second, I wanted to help Zara to develop language for her to describe her experiences and self-monitor her intensity. Third, since I planned to use exposure therapy as a core part of treatment, I wanted to use this list to form the basis of a subjective unit of distress (SUDS) hierarchy to be used for exposure exercises. Lastly, given Zara's history of feeling shame about her symptoms, invalidation of her distress, and experiences of "teasing" by her friends and family, I wanted to demonstrate to Zara that therapy was a safe space where her experience would be validated.

CBT TREATMENT OF MISOPHONIA CASE

In returning to the SUDS ratings, we focused on the difference between, 40, 50, and 60 out of 100 points on the scale. Zara was provided with the following information:

40 = “Mild-to-moderate distress” (Some discomfort, but no avoidance/escape or socially inappropriate coping strategies)

50 = “Moderately distressing” (You are uncomfortable, but able to perform basic tasks without avoidance/escape; undesired coping strategies may be present).

60 = Moderate-to-strong distress (Moderate discomfort; you sometimes leave situation/avoid and/or use inappropriate coping strategies).

Zara created “anchor” experiences for 20, 40, 50, and 60, 70, 80, 90 and 100. After establishing the thermometer ratings, we used the same ranking system to develop a hierarchy of triggers/situations for her triggering stimuli. Zara rank ordered the trigger sounds from least to most distressing: crunching noise (particularly chips), slurping, lip smacking, and tooth picking. For each trigger, she created a SUDS hierarchy. The hierarchy for crunching sounds was the most extensive and is included in Table 2. Across all trigger sounds, Zara noted that her symptoms and misophonic response were most severe when in the presence of family members and close friends.

Zara identified the following presenting problems problem areas to address in treatment: avoiding or immediately leaving social situations, engaging in coping behavior that is embarrassing, inappropriate, harmful or aggressive to herself or other, and generally “doing things that are not me” (i.e. digging nails into her hand, putting her fingers into her ear, “always” wearing headphones, leaving situations abruptly, yelling at or pushing others). These preliminary goals were translated into the goals described earlier in the case.

CBT TREATMENT OF MISOPHONIA CASE

The homework assignment was adapted from Judith Beck's (1995) text and the model provided by Bernstein et al. (2013) in their misophonia CBT case study. The homework consisted of a thought record sheet that included the columns: Trigger sound, thought, physiological response/emotion, behavior and outcome/consequence. A sample thought record form is presented in Appendix C-1. I requested that Zara complete the form anytime she either avoided a situation out of concern that she would encounter a trigger or in situations where she encountered a trigger.

Motivational Interviewing Techniques

While Zara had thus far demonstrated a commitment to treatment during the first intake session, I was concerned that her stigma about seeking mental health treatment, feelings of hopelessness about making change, and reservations and mistrust of "western" doctors posed a potential threat to our therapeutic alliance and her continued motivation in treatment. Throughout this second intake session, I utilized specific techniques from motivational interviewing to help increase her motivation and readiness for change and demonstrate to her that therapy was a safe, non-judgmental and validating environment where she would be supported and heard.

I accomplished this by seeking out opportunities to use OAR (Open-ended questions, Affirm, Reflective statements). I purposefully asked open-ended and detailed questions and would respond to her answers with summaries and reflective statements. By doing so, I sought to communicate to Zara that her input and expertise was critical to our collaborative relationship and that I was actively listening and attending to what she said. I reflected back to her that I was attending to her when she discussed the stigma and attitudes regarding mental health in her country. I normalized this experience and invited her to share with me if she experienced shame or embarrassment about coming in for treatment. Cognizant of her history of being criticized and invalidated by her parents, I regularly sought out opportunities to affirm and validate her

CBT TREATMENT OF MISOPHONIA CASE

emotions and the “realness” of her symptoms (such as in creating the SUDS hierarchy). I sought to validate and align myself with her by responding to her descriptions of her distress with seriousness and empathy. To enhance motivation and readiness for change, I purposefully reinforced her use of “change language” (i.e. language that emphasized her desire, ability and willingness to make change) (Miller & Rollnick, 2002). I sought to reinforce and highlight the reasons that she said that she sought out treatment (“I want to do normal things like everybody else”) to emphasize her intrinsic motivation and desire to make changes in her life. During the intake, Zara had described having years where she felt shame and hopelessness about her ability to make change. When she smiled and expressed cautious optimism about the treatment plan, I made sure to express my confidence in her ability to make changes and to be able to pursue the activities and relationships that were important to her. I used the discussion of the collaborative nature of therapy and my continued support, to help strengthen the therapeutic alliance and “tip her” in the direction of giving therapy a real shot.

Phase II: Cognitive Restructuring

Phase II of Zara's treatment involved two 60-minute treatment sessions. In this phase, Zara learned about the cognitive model and developed cognitive restructuring skills.

Treatment Session 1

Treatment Session 1 began with a check-in about the homework and medical evaluation. We reviewed the treatment plan, and I educated Zara about the CBT model and cognitive therapy thinking traps. I introduced her to Socratic questioning, and I assigned homework for the next session.

Zara completed the A-MISO-S rating scale prior to this session. Upon entering the therapy room, I again checked in with her about her feelings of discomfort in the waiting room.

CBT TREATMENT OF MISOPHONIA CASE

She reported feeling “less nervous,” although she noted continuing to fear seeing a peer. I validated her decision to return and framed this decision as an act of self-care. We collaboratively created an agenda for the session. She indicated that she had completed the homework. She reported that she had not seen an audiologist and that she was still having difficulty finding a doctor. I noted that I still wanted her to have an evaluation, but in the meantime that she should bring in any medical information on her hearing.

The first items on the agenda were to review the treatment plan and rationale for treatment. I provided Zara with a summary of what I had learned regarding treatment of misophonia. I noted that while there are no evidence-based treatments that there was one large scale study and a growing case-study literature that seemed to indicate that cognitive behavioral therapy is a promising treatment modality. I discussed my background and training in CBT and described the CBT session structure as collaborative, skills-focused, and emphasize current problems and concerns. I stated that I would rely on data that I would collect each week to track progress. I described the treatment as primarily focusing on strategies to help her to better cope with the misophonic response and to “become more comfortable with being uncomfortable.” I provided her with an overview of what I saw as the treatment plan: to help her identify and challenge negative thoughts and assumptions, develop relaxation strategies, and complete exposure exercises to help her become less sensitive to trigger sounds and test out some of these assumptions in real time. I also mentioned that CBT interventions are pragmatic, and that I was also very interested in building upon the positive coping strategies that she is currently using.

During the second half of the session, I introduced Zara to cognitive restructuring. In order to illustrate how our assumptions and thoughts impact our experience, I had her visually scan the room. I asked her why she decided to attend to me. She noted that it was because “I’m

CBT TREATMENT OF MISOPHONIA CASE

in a therapy office.” I pointed out that her decision to focus on me might seem obvious, but that this was an assumption. I asked her to consider what her experience in the room would have been like if she had focused on the clock the entire time. I noted how focusing on the clock would change automatic thoughts as well as her affective response and behavior how this would have impacted automatic thoughts. Drawing the connection back to her anger and disgust, I asked her what information she attended to (both internal sensations and external stimuli) and how this would inform her experience. She described an experience with her mother “slurping” during her last visit home. She noted that she would get tense in her stomach and feel hot in her ears and that this “told her that she was mad.”

I drew a cognitive triangle with thoughts, physiological reaction/affect, and behavior and described my hypothesis that her response to triggers was likely influenced by assumptions and beliefs that she had about her, others and the future and her past. We reviewed language from the cognitive therapy model including negative automatic thoughts, intermediate thoughts (i.e. assumptions/rules), and core beliefs. I emphasized that the goal of cognitive therapy was to help monitor her thoughts, identify unhelpful assumptions and beliefs and then to re-evaluate them in a way that was more balanced and neutral.

I followed the instruction by Judith Beck (J. S. Beck, 2011, p. 81) for teaching clients to elicit and identify automatic thoughts. I oriented Zara to an example of an automatic thought from her homework. In this example a friend “slurped” from a soda. Zara then “immediately” she “blasted” music into her headphones that were already in her ears. She then ran to her room and slammed the door. I noted how a change in affect typically accompanies automatic thoughts. She described several automatic thoughts including: “she’s disgusting” “here we go again” “She’s so inconsiderate.” I had Zara identify evidence for and against this first thought.

CBT TREATMENT OF MISOPHONIA CASE

I provided her with a thinking traps worksheet (J. S. Beck, 2011, p.119) to together we labeled some of her thoughts written in her homework. She identified the following thinking traps (i.e. cognitive distortions): mindreading, catastrophic thinking, fortune telling and personalization. I guided her in use of Socratic questioning to challenge these thoughts (J. S. Beck, 2011, p. 109). Zara found the following questions to be most helpful: *what is the evidence for and against this thought, is there any information that you are not taking into account, what is the percentage likelihood of this happening, is it possible that there could be another outcome and what would I tell a friend who told me the same statement.*

I provided psycho-education on emotions including anger and disgust. Zara described how her body felt when angry, pointing to her warm face, racing heart, and sweaty hands. She described similarly how she felt with anxiety and disgust. For disgust Zara described feeling “nauseous.” She puckered her face and held her stomach.

Homework included: Completing a modified thought record from the previous week. This thought record included additional columns for Zara to identify the thinking trap and to come up with a re-appraisal.

Treatment Session 2

In Session 2, I began by reviewing the previous week’s homework. We then used “downward arrow” cognitive restructuring exercises to identify assumptions and core beliefs followed by an exercise to challenge these beliefs/assumptions. Zara then came up with some coping statements and I assigned homework for the following week.

At this session, Zara stated that she felt more comfortable in the waiting room this session. She attributed this to her “successful week” of using cognitive coping strategies and feeling less shame about being in therapy. She brought a copy of a physical evaluation from a

CBT TREATMENT OF MISOPHONIA CASE

doctor back in her home country that indicated that she was in good health, but she had not made an appointment with a doctor. She reported that a hearing exam was completed, although it was not listed on the document.

In reviewing Zara's homework from the previous week, we selected one of the examples and did a breakdown of her moment-to-moment thoughts, feelings, and behaviors. Prior to reviewing this example, she noted that she had difficulty identifying the emotions. She noted that, in her home country, people didn't talk about feelings. I provided psycho-education on the link between emotions and the body, and on anger and disgust in particular. I modeled a cognitive restructuring strategy of normalizing, by describing emotions as healthy and adaptive and indicators that our body is reacting to something with urgency in our environment.

In returning to homework, she elaborated on an incident where she had encountered a friend in her suite eating a bag of chips. She described feeling nervous when she heard the door to the dorm room open, followed by increased stress (increased heart rate) when she heard the television turn on. She then felt angry when she heard someone slurping. She looked at her notes while identifying the emotion. She noted that she was able to identify the automatic thought of "they're being mean on purpose" and that she labeled it with two of the thinking traps (personalization and mind reading). Zara described this incident as happening too fast for her to address her thoughts. She noted that better understood what was happening with her thoughts but that she was concerned that she would lose control. She reported a number of self-critical judgments ("I'm crazy" "everyone will laugh at me"). I normalized her difficulty by reflecting to her "you're brand new at this. You're way better at this than I was when I started." I prompted her to challenging this thought in session. She used Socratic questions of "what is the evidence?" She struggled to come up with evidence against "everyone will laugh at me." I used this as an

CBT TREATMENT OF MISOPHONIA CASE

opportunity to discuss behavioral experiments test out whether our “worst case scenario would occur.” I described this technique as “decatastrophizing.” I asked her to describe the worst-case scenario if people laughed at her. She responded that she would “Either die inside or I might push her out the window.” She identified a 1% chance of “completely losing control” and she noted that imaging the worst-case scenario “actually made me feel better.”

I used a downward arrow technique (Beck, 2011) of asking her to identify the thought that she had in that moment and then asking her to identify the meaning of this thought. She identified the thought as “She is messed up” → “She’s making me mad on purpose” → “People always ignore my feelings” → “Other people are inconsiderate and selfish.” When asked if there was any other information or explanation, she paused, and then responded that she knew they were friends and it was possible that her roommate did not know that she was in the room. She acknowledged that it was possible that her friend could slurp in front of her and that she may not be purposefully trying to hurt or upset her. Using the downward arrow technique, she identified assumptions of “If I stay I’ll lose control” “I can’t handle the triggers” “My roommates are selfish” and core beliefs of “I’m weird” “I’m helpless” and “No one cares about my needs.” Through these exercises, she appeared to have insight that her reaction to triggers were not automatic and that her reaction to her roommates was deeper than just the trigger. I guided her in coming up with coping statement that sought to embrace uncertainty and transitory nature of emotions. She came up with coping statements of “Maybe she doesn’t know that it bothers me,” “this feeling will pass,” “I can get through this,” “a chip can’t hurt me,” and “I’ve never made myself bleed, I’m probably not going to now.”

For homework, I requested that she complete another *modifying thoughts* sheet, like during the previous week. She wrote down coping statement at the top of the sheet.

Adding an Additional Component to Treatment Plan

At this point in treatment, Zara appeared to be responding well to cognitive restructuring techniques and appeared to be developing insight into the role of her thoughts in her misophonic response. Despite this progress, I noticed a pattern of self-critical thoughts and recalled that she had mentioned that she felt physically “out of control” and unable to focus if she suspected she might encounter a trigger sound. I conceptualized this group of challenges under the umbrella of difficulty regulating her emotions and arousal levels. I recalled from the research on the neurological vulnerabilities in misophonia that there was irregular activation in the vmPFC. This is an area of the brain that is central to self-regulation, impulse control, and attentional control, which fit Zara’s concerns. I saw her challenges regulating her emotions and attention as a potential barrier for effectively utilizing cognitive coping strategies and potentially as one of the factors that contributed to her elevated distress and impulsive fight or flight decisions.

I decided to focus the next session or two to introduce Zara to the practice of mindfulness as well as to teach her relaxation strategies. I selected an exercise from MBSR because of the strong evidence-based demonstrating that mindfulness training improved attention and impulsivity in individuals with ADHD and anger (Zylowska et al., 2008) as well as providing benefits of stress and cortisol level reduction (Gaab et al., 2003). The mindful breathing script that I selected was from a MBSR Workbook (Stahl, Goldstein, & Kabat-Zinn, 2010). It included an introduction to mindfulness and a focus on observing one’s thoughts, emotion, and breath. I saw a secondary benefit of the exercise being that by strengthening Zara’s attentional control she potentially better filter and redirect her attention to distractor sounds to reduce her distress level if she was in a setting with trigger sounds (Schröder et al., 2014).

Phase III: Building on What Works, Mindfulness, Relaxation, and Prepping for Exposure

Phase III of Zara's treatment involved two 60-minute treatment sessions. In this phase, I sought to build on Zara's effective repertoire of coping strategies, introduce her to beginner mindfulness exercises, relaxation techniques, and prepare for exposure sessions.

Treatment Session 3

In Session 3, I began by reviewing the previous week's homework. I then reviewed her current outside-of-therapy coping strategies, taught Zara problem solving skills, and completed the session with a mindfulness of breath exercise. Finally, I assigned homework for the following week.

Zara completed rating scales prior to the session. We established the agenda for the day then reviewed her homework. Zara reported that she felt more comfortable using the cognitive coping strategies during last week and that she "actually enjoyed therapy." She noted that she had even decided to tell her roommate that she was in counseling. She discussed a "big event" that included staying in her dorm room suite while this same roommate drank a soda. She noted that she felt "on edge" for the first 30 minute, but then she was able to enjoy watching TV together when her roommate made a loud "slurp." She noted feeling "less angry than usual," but that she "couldn't believe that she forgot. She probably doesn't care about me." Zara noted that she had used Socratic questioning for her thoughts (e.g. "what is the evidence?") and that she labeled her thoughts as "the misophonia." She stated that she used the coping statement, "I can get through this."

I checked in with Zara again regarding her audiological evaluation. Zara stated that she had not made an appointment because she was "not comfortable" seeking medical care from physicians other than her primary care doctor in her home country. I thanked her for sharing and

CBT TREATMENT OF MISOPHONIA CASE

asked if there was anything that I could do to make the process easier. I told her that I would speak with my supervisor.¹

We reviewed problem-solving skills using a 5-step plan: 1) say the problem; 2) think of solutions; 3) evaluate the solutions; 4) pick one; and 5) see if it works. In an effort to build on what works, Zara reviewed her coping strategies for when her roommate was slurping. She described effective strategies of listening to music, distracting herself by looking out the window, asking the person producing the noise to stop, using coping statements, and breathing. She described the following ineffective strategies: putting her fingers in her ears, running out of the room, avoiding potential situations altogether, yelling at the perpetrator, pushing the perpetrator, slamming the door to her room, and picking at her hand. I asked Zara what constituted an effective strategy, and she replied that an effective strategy would not cause her embarrassment and would allow her to remain in the room without saying or doing anything aggressive. We discussed how avoidance over time increased her distress, whereas staying in the room would allow her to test out some of her assumptions. She described her use of “ineffective” strategies as examples of her “being weak.” I validated her frustration and negative feelings, and we explored how her judgments self-criticism affected her affect and behavior.

I introduced her to the concept of mindfulness. I described mindfulness as a technique that is present-centered, non-reactive, non-judgmental, and involves curiosity, openness, and self-compassion. I called mindfulness a skill that is based on Zen Buddhist meditation practices that has been adapted to be effective for coping with stress, anxiety, and anger (Baer, 2006). We

¹ After the session, we collaboratively decided that if we received Zara’s consent to move forward, we would move forward with treatment without the examination. We came to this conclusion based on her excellent health, her long history misophonic symptoms without physical pain and her lack of any other reported hearing problems.

CBT TREATMENT OF MISOPHONIA CASE

completed a mindfulness of breath exercise from the Mindfulness Based Stress Reduction Therapy (MBSR) Workbook (Stahl et al., 2010).

In this exercise, which lasted 10-minutes, I asked her to attend to her breath (Stahl et al., 2010, pp. 180–182). I guided Zara through the exercise with her seated with her eyes directed at the floor. I had her attend on her breath as she breathed normally. I asked her to draw her attention in her “mind’s eye” to a single point of her breath (her nostrils, her chest rising and falling) and to breathe into her stomach. We processed her experience following the completion of the ten-minute exercise. She described feeling self-conscious at first, thinking thoughts of “is he looking at me.” She noted that got into it once she “let go.” She found my instructions to labeling her mind as “wandering” and redirect her attention to her breath to be helpful. She described judging herself for “not doing it right,” but at the same time she surprised herself with her ability to refocus. She reported that she felt relaxed and calm after the exercise. I described mindfulness as a “muscle” that requires practice to build up, but and that this was just an introduction.

I emailed Zara two audio files of mindfulness exercises. For homework, she was given a tally sheet and asked to practice a mindfulness exercise at least once per day and to continue to use the modifying thoughts sheet.

Treatment Sessions 4

In Session 4, I began by reviewing the previous week’s homework. I provided training in a relaxation exercise (Progressive Muscle Relaxation). This was followed by a review of the rationale for exposure, developing a SUDS hierarchy and prepping for first exposure exercises. We completed the session with a mindfulness of breath exercise and assignment of homework.

CBT TREATMENT OF MISOPHONIA CASE

The session began with completion of the A-MISO rating scale, review of the homework and setting of an agenda. Zara reported that she had enjoyed the MP3 for mindfulness of breath and that she had found some other mindfulness exercises in a smartphone app. She noted that she completed “many over the week. Zara noted that she had discontinued using the thought record form, but that she continued to write down her automatic thoughts and her re-appraisals in the notes application of her phone. She reported that she encountered four situations during the previous week involving trigger sounds. She utilized a mindfulness to help her relax in one instance and that was helpful even though she still put her fingers in her ear. Zara reported feeling that she was “gaining momentum” in treatment and that she was ready to try doing exposures.

I guided Zara through a progressive muscle relaxation exercise. The rationale for these exercises is that they are effective in reducing stress and aiding physiological relaxation. I indicated to Zara that these exercises can be helpful in situations where she feels “out of control” with anger or disgust and that the breathing technique can also be used to help her relax during exposure exercises.

I introduced the rationale and goals for exposure. To explain the rationale for exposure I drew a graph with distress on the Y-axis and time on the X-axis. I asked her to describe an experience from the past week where she left a situation where a trigger was encountered. She described being in an elevator when someone drank a soda. She drew a diagonal line rising with a steep upward angle and described this as what happens when she encountered a trigger sound. I asked her to describe her experience at this point. She noted that she felt “panicked” and “angry” and that she was starting to get hot physically. She said that she put her headphones in her ears and played music loudly. She described a worst-case scenario of “pushing the girl” and “feeling

CBT TREATMENT OF MISOPHONIA CASE

embarrassed.” Even though she knew her thoughts were “off”, she left the elevator at the wrong floor to escape. She noted that just prior to leaving, she was digging her nail into her hand and putting her finger in her ear, and that her SUDS rating was at 80. She reported that immediately upon leaving the elevator it dropped down to a 20-30 and she “felt silly.” I drew a sharp descending line on the graph to demarcate the decrease in her distress that can occur with distraction and/or escape. Following this example, I framed the purpose of exposure to be three-fold. The first purpose is to break the association between presence of the trigger sounds and her anger/disgust and fight or flight somatic response. This would be achieved through becoming desensitized or habituated to the sounds. The second purpose was to break or discontinue the association between escape and distraction from the sound and relief. The third purpose of exposure was to allow for testing assumptions about what would happen if she did not escape the sounds. This included facing her worst-case scenario to determine if it came true and, if it did, to demonstrate to her that she was able to cope.

I explained the structure of the exposure sessions and guidelines for her during exposure. This included the importance of remaining focused on the sound, on her thoughts, and on her internal experience, and to avoid engaging in distraction, escape or safety behaviors. I described these behaviors as “like a rabbit’s foot” or anything that she saw a “protecting her” or “keeping her calm” such as fingers in ears, digging a nail into her hand, or acting out anger responses. We reviewed the SUDS thermometer and noted that I would have her rate her subjective level of distress by pointing to the corresponding number on the thermometer. Her rating would be completed at intervals of every five minutes.

We discussed the component of response prevention. Zara engaged in a coping strategy of putting headphones in her ears or her fingers in her ears. During the exercise, a behavioral

CBT TREATMENT OF MISOPHONIA CASE

goal was for her to engage in behavior that was incompatible with those actions, such as holding onto a ball or placing her hand on her lap.

We completed the session with a review of a diaphragmatic breathing exercise.

Homework for the next session included use of the relaxation exercise daily and continued use of modifying thoughts sheet.

Phase IV: Graded Exposure Exercises

Sessions 5 – 10 were each 60 minutes and had similar goals and components. Each session, included a review of homework, review first exposure exercise, rationale for doing exposures, instructions and goals for each exercise, completion of exposure exercises and assignment of homework.

In Preparation for Session 5: I realized in preparing for the exposure that I needed to adapt the exposure scripts in order for the content to be appropriate for anger and disgust. The scripts in the Abramowitz & Jacoby (2017) focused on orienting the client to intrusive and obsessional thoughts specific to the different fears associated with OCD (e.g. contamination, symmetry, checking, etc), while Zara's distress was associated with disgust and anger. During the exposure sessions, Zara needed to interact with the exposure stimuli in order to elicit her anger. This involved imagining having a relationship with a girl in a video or attributing thoughts and intentions to the confederate. My shift in perspective to seeing misophonia through an anger lens, led me to encourage Zara to use relaxation techniques (i.e. breathing) during exposures and focus on expectancy violation during exposures more so than habituation.

Session 5

The session began with completion of the A-MISO and MQ rating scale, review of the homework, and setting of an agenda. Zara reported that she had completed one mindfulness

CBT TREATMENT OF MISOPHONIA CASE

exercise daily. Zara completed the homework successfully and noted that she particularly enjoyed diaphragmatic breathing exercises. She noted that she had used this exercise multiple times per day and, that by using it prior to entering a situation where she anticipated encountering a trigger sound, she was able to cope more effectively. She identified several instances of remaining in a setting with the potential for encountering a trigger sound, whereas she was confident she would have left in the past. I praised and validated her use of the breathing technique and noted that this would be helpful during today's session.

I guided her in constructing an agenda for the day. I mentioned that the focus of the day's session was to complete our first exposure exercises. I reviewed the rationale for completing exposure to develop buy-in and help her to understand the context and goal of the exercises. I had her identify how approaching triggers were consistent with her values and goals. She noted that she wanted to be "in control of my own life" and that she was "ready to do it!" While Zara expressed excitement, she picked her nails, indicating that she may have had apprehensions. We began the session with a guided mindfulness of breath exercise.

We reviewed the first items on her SUDS hierarchy for chewing. They involved imaginal exposures. The first exposure exercise included imagining a stranger chewing chips quietly from across the room. I handed her a piece of paper for her to write down her responses to the pre-exposure set-up. First, I asked her to describe the situation and rate her SUDS. She rated her distress as a 30. I asked her to describe what about the situation she found distressing, focusing first on external cues and then on internal sensations. She created a context where she knew the person from class and that they knew about her misophonia. Second, I asked her to describe the emotions (e.g., anger, disgust, anxiety) she anticipated having. Third, I asked her to write down specific thoughts she anticipated having. Fourth, she was instructed to write down the worst-case

CBT TREATMENT OF MISOPHONIA CASE

scenario and the percentage likelihood of it happening. Finally, I asked her to identify and write down a relaxation strategy and a coping statement.

Immediately prior to the exposure, I she took several deep breaths raising her diaphragm. I reminded her of the rationale for exposure and why it's important to "stick it out." I framed the exposure as an environment where she should test out assumptions that she had. And thus, I wanted her to be evaluating whether her worst-case scenario was happening. And, if it did happen, how did it compare to her expectation and was she surprised by her reaction. I told her that she was always in control of when an exposure ends, but that I would be there to coach her through this. We established a goal for the session of her remaining focused on the sound in her mind and my directions without distracting herself. I then placed the SUDS thermometer in front of her and had her point to the SUDS number at 2-minute intervals. Throughout the exposure, I asked her to identify her emotions, the thoughts of anger and disgust and to keep breathing. After the exposure, we would do a debrief where I would show her the graph of her SUD ratings over time and she would evaluate the outcome of her "experiment."

To illustrate an exposure process, I will review the first video exposure. For this exposure, I created a PowerPoint presentation of a young woman who was eating a bag of chips (See Appendix D-1 for a screen shot). This video was found posted on YouTube. In the video a young woman opens a bag of Lays potato chips. The camera zooms in on her mouth and she places a chip on her lips and then takes a slow bite. They then commence to eat the bag over the course of 5 minutes, chewing with their mouths open. I put the video on loop and had the volume on low. Zara identified the situations and created a social context for the girl eating. She imagined that this was a classmate sitting outside of class. She described feeling disgusted by the sound and angry at the girl and anxious about embarrassing herself. Her thoughts included:

CBT TREATMENT OF MISOPHONIA CASE

“She’s chewing loudly on purpose.” “She’s a pig.” “If I don’t stop her I’ll lose control.” With guidance, she identified the distortion of mindreading, labeling, and emotional reasoning. She described a worst-case scenario of Zara shoving her or Zara digging her nail into her hand and bleeding. She assigned a likelihood of the former at 20% and the later at 40%. I pushed to embrace this uncertainty and that the only way for her to find out was to test it. She practiced diaphragmatic breathing. She identified putting her fingers in her ears as her preferred way to cope and noted that she would put her hands in her lap. She rated her SUDS rating at a 75 prior to starting.

Zara sat in front of my computer in my office and pressed the spacebar to start the exposure. She immediately went to put her shoulder against her ear. I redirected her to relax her shoulders and remain focused on the sound coming from the computer. I prompted her to breathe and to stay focused on the physical sensations in her body and the thoughts of anger that she was experiencing. She lowered her shoulders and began to speak some of her positive self-talk statements under her breath (“That chip can’t hurt me.” “This is just my misophonia”). Her body began to look relaxed. I redirected Zara to the sound asked her to identify what about the situation is causing her anger or disgust. Zara replied that she felt like she needed to “shut them up.” Zara took a deep inhalation and exhalation. She then rated her SUDS at a 50. The exercise continued for 10 minutes, with Zara ending the exercise with a SUDS rating of 20. In processing the experience, Zara noted that she felt anxious, disgusted, annoyed, and then angry. She noted that she was not aware of her shoulder going to her ear and that she wanted to run away or yell at me for “forcing her to do this.” She noted that at “around the time of my second rating, I realized that I didn’t even know this girl, so she was probably just eating chips.” She said that she felt in control at the computer screen knowing that she could stop at any time and this helped her to

CBT TREATMENT OF MISOPHONIA CASE

continue forward. She noted that she felt physically tired by the end and that she was “actually bored.” She said that she was proud of herself that she continued to the end and that “it actually did get better over time...” and “nothing bad actually happened.” I validated her insight and praised her for her willingness to complete the exercise. I shared with her the graph of her SUDS ratings to visualize that they went down over time. She took a water break and continued onto the next exposure.

Treatment Sessions 6 – 10

The remainder of the chewing exposures exercises was completed during session 6 and 7. All five lip-smacking exposures were completed during session 8. Slurping exposures were completed in session 9, and tooth-picking exposures were completed in session 10. Each of the exposure hierarchies included imaginal, video exposures using the PowerPoint slides, and in person exposures with the therapist and a confederate. There was no out of session exposure homework sessions assigned. Zara continued to use her cognitive coping strategies, mindfulness and relaxation strategies.

During the final exposure of treatment, Zara completed an in-vivo exposure for tooth picking where a confederate picked her teeth with her finger. She had initially rated this exercise as having a SUDS score of a 90, but prior to starting the exposure she decreased the score to a 50. The exposure lasted only 4 minutes before Zara scored her SUDS rating at a 10. She reported feeling “bored” during the last minute of the exposure.

Phase V: Consolidating Gains and Maintenance Plan

Treatment Session 10

At the end of the final session, I reviewed Zara's treatment data including the A-MISO-S, MQ, and CCAPS-62. I presented the A-MISO-S data on two graphs (See Figure 2– the same data are also presented in Table 3). In this graph, I described the lines as reflecting qualitative ranges of scores associated with different levels of severity. I also presented the MQ data on a separate graph (See Figures 5 and 7 – the same data are also presented in Table 3). Zara reported that presenting the scores visually was helpful and allowed her to see the progress that she made in a way that she could easily understand. As I reviewed her scores and graphs, I also got her feedback on treatment. Zara described therapy as a positive experience and that she felt sad about termination. She noted that she was happy that she came in for treatment and that she that she had made progress on her goals. She reflected, "I thought that therapy was just for crazy people, [but now] it's not that bad." I had her review different skills that were completed during sessions and asked her to reflect on her growth as I went through the data. In reviewing her CCAPS-62 data for the final session, I noted that her "Hostility" score improved and that this was consistent with the shift that was seen on the misophonia measures. Zara reported that she continued to feel anxious and be afraid about saying something embarrassing in groups.

I went through each of the Schröder et al. (2013) criteria for misophonia. Zara reported that she was still "sensitive" to trigger sounds (i.e. she was more attuned to them than others"), but they no longer provoked an "impulsive aversive physical reaction" that "instantaneously becomes anger" (Criteria A). Zara reported that she had noticed a shift in her perspective on the causes of her anger. She attributed this shift to her understanding that she had assumptions about the intentions of the person producing the sound that often did not "consider all of the

CBT TREATMENT OF MISOPHONIA CASE

information.” She attributed this change to the cognitive restructuring and insight that she gained from reflecting on her initial experience with her mother. Zara noted that she no longer felt “out of control” or fearful that she would act aggressively (Criteria B). She attributed this change to shifts in her beliefs and assumptions about herself that included increased confidence in her ability to cope as well as the fact that she no longer had the same physical level of distress when she thought she might be exposed to triggers. She said that the exposure exercises were the most helpful part of treatment in proving to her that the worst-case scenario of acting violently, injuring her or being embarrassed is not likely to happen. She continued to recognize that the anger and disgust responses were excessive and now she described her responses as “silly” (Criteria C). Zara no longer avoided situations due triggers or fear of triggers and she reported that she occasionally experienced distress (Criteria D and E), but that this was “manageable.” Zara reported that prior to the last session she had walked through the cafeteria for the first time in over a semester. She felt anxious but confident that she could handle herself even if she encountered a trigger.

At the end of the session, I discussed the importance of practicing the skills learned and in continuing to pursue exposure exercises in her daily life. I emailed her the PowerPoint and recommended that she do self-guided video exposures on a regular basis. We made an appointment for six months after treatment.

Six-Month Follow-Up

Due to a scheduling conflict, another clinician at the Counseling Center saw Zara for the 6-month follow-up. I spoke with the clinician prior to the session and requested that she administer the A-MISO-S and the MQ. Going into the session, though, the clinician was not aware of Zara’s pre or post-treatment presentation or scores on the rating scales. Zara completed

CBT TREATMENT OF MISOPHONIA CASE

the A-MISO-S and the MQ, but the CCAPS was not administered. Zara reported that she had used the power-point exposure stimuli for 2-3 weeks following treatment, but that she had not used it since. During the six months since the last session, she noted that her sensitivity to the trigger sounds had increased over time, but that she continued to use the coping statements, breathing techniques, and redirecting her focus. She described increased sensitivity as noticing trigger sounds and sometimes getting annoyed, but she no longer felt “out of control.” She said, “I just don’t get that angry anymore or that worked up.” She reported that there had been no instances where she had said something “mean.” Also, since the end of treatment she thinks of her misophonic reactions as “in the past” and that she “felt silly” that they were such a big deal for her. She attributed the biggest changes to the exposure exercises that proved to her that she could handle the triggers and that “nothing bad would happen.” She noted that she had not been home yet to test out her strategies with her mother and father. Zara reported that she continued to feel “socially awkward” sometimes, but that this was not connected to the misophonia.

CHAPTER VII

Therapy Monitoring and Use of Feedback Information

To summarize, she had an overall goal of reducing misophonia symptoms with three more focused functional goals. The first goal was reducing inappropriate coping response and increasing use of appropriate coping. The second goal was decreasing distress and sensitivity to triggers. Finally, she wanted to improve her overall functioning, including a reduction in avoidance and social interference and improvement in psychological functioning.

Over the course of treatment, I utilized both quantitative and qualitative indicators of progress, including the effects of specific intervention and non-specific intervention factors. The A-MISO-S was administered weekly and was the primary scale that I looked to evaluate the effects of the intervention on overall misophonia symptoms. I looked at the qualitative range of the overall A-MISO-S total symptom score, but I also attended to the individual items to look for indicators of functional changes that aligned with the treatment goals. The addition of the MQ provided an opportunity to examine whether Zara's responses were consistent with those on the A-MISO-S in areas where the two overlapped. The MQ-P3 scale provided a global measure of symptom severity and degree over interference with her life.² Her score on this measure, like the A-MISO-S total score, followed a downward trend during the course of the intervention, providing evidence of the overall effectiveness of the intervention package. On both the A-MISO-S and the MQ, the largest session-to-session improvement occurred following the start of exposure sessions. The first exposure took place in session 5, and since rating scales were administered at the beginning of a session, this change is reflected in session 6 data (on the A-

² In a note on the qualitative ranges: For both the MQ-P3 and the A-MISO-S, I considered the qualitative ranges as helpful guides and useful for communicating with Zara regarding her progress, but I remained skeptical about their construct validity. With that said, with a new disorder with limited research and options for rating scales, these ranges are the best common descriptors of symptom severity in the literature.

CBT TREATMENT OF MISOPHONIA CASE

MISO-S) and session 7 data (on the MQ). The improvements in symptoms, as measured on both instruments, were maintained at 6-month follow-up.

To illustrate how I utilized the rating scales to inform treatment decisions, I would like to focus specifically on treatment goal of reducing distress when presented with triggers sounds. I monitored changes in her distress when in the presence of triggers by examining her self-report on individual items on the A-MISO-S, the MQ in addition to her SUDS ratings. On the A-MISO-S, I followed Item 3 (“How much distress do the misophonic triggers cause you?”; See Table 4); on the MQ-P2 I monitored Item 4 (“Become anxious or distressed?”; See Table 5); and during the exposure exercises I asked her to rate her SUDS for triggering situations prior to and following the exposure. Both the A-MISO-S and MQ scales were 0-4 Likert scales, with the A-MISO-S emphasizing intensity (0= None; 1=Mild; 2=Moderate, Sometimes True; 3=Severe; 4=Extreme) and the MQ-P2 focusing on frequency of avoidance (0=Not true at all; 1=Rarely True; 2=Sometimes True; 3=Often True; 4=Always True). For the A-MISO-S Item 3, there was a reduction from “extreme” to “severe” following the cognitive restructuring and mindfulness phases (Phase II and III) and then a reduction in distress from “severe” to “mild” from the start of the first exposure sessions (Session 5) to the end of treatment. Her responses on the MQ-P2, Item 4, followed a similar trend, beginning treatment at “always true” (4) and finishing treatment at “rarely” (1). Her subjective rating of distress on her SUDS hierarchy were high at the beginning of Session 5, and then following each exposure exercise, her distress ratings were reduced, providing additional support for the conclusion that the treatment package was effective, and exposure sessions in particular, were critical in the reduction of her distress.

While I looked to rating scales for progress in treatment and the effectiveness of the intervention, I placed a similar value on her self-report and qualitative information. The fact that

CBT TREATMENT OF MISOPHONIA CASE

Zara showed up for all sessions, completed all homework assignments, and described feeling optimistic about treatment provided indirect indicators that there was buy-in for treatment and that she was seeing a meaningful connection between the sessions and improvement in her quality of life. Zara's completion of homework assignments indicated that not only was there a reduction in her use of inappropriate coping skills, but that she was also increasing her use of effective coping strategies. Zara also self-reported decreases in avoidance behavior and increases in social contact. This qualitative information supported the improved scores on the rating scales.

Throughout treatment I met with my supervisor weekly. His input on the neuropsychological basis of her disorder was invaluable in guiding the case formulation and then implementing an effective intervention. His description of how the mechanisms underlying anxiety appeared similar to the disruption in the anterior cingulate cortex strengthened my decision to utilize exposure and response prevention. It was also guidance from my supervisor related to research on the positive effects of mindfulness on stress that led to the addition of the mindfulness of treatment. Working collaboratively with my supervisor increased my confidence in the treatment plan and provided me with a perspective on the biological mechanisms of her disorder that shaped my approach to treatment.

CHAPTER VIII

Concluding Evaluation of Therapy Process and Outcome

Treatment Outcomes

Evaluation of Changes in Misophonia Symptoms. Zara's initial reason for referral was to reduce her symptoms of misophonia. At pre-treatment (i.e. the beginning of the second intake) Zara met all six criteria for Schröder et al.'s diagnostic criteria for misophonia (with the exception of partial criteria for Criterion A). On the A-MISO-S, she scored in the "Extreme" range (with a score of 23 of 24 points) in terms of her overall symptoms (See Table 3). Her score on the MQ-P3 score (12), which fell in the "Severe" range was consistent with her A-MISO-S score (See Table 3). Her MQ-P3 score indicated that she experienced "sound sensitivities that are crippling to me, interfering so that daily activity is an 'active struggle.'" There was no qualitative descriptor for the MQ Total Score or each of the two subscales (MQ-P1 and MQ-P2). Her MQ-Total Score at pre-treatment was 54, which was over 3 standard deviations higher than the mean ($M = 31.21$, $SD = 7.64$) among those diagnosed with misophonia in Wu et al.'s (2014) validation study for the MQ. On MQ-P1, Item 1, she indicated that it was "always true" (score of 4) that she was sensitive to eating sounds. On the MQ-P2, she endorsed that she used a variety of inappropriate and undesired emotional and behavioral coping strategies (See Table 5) with a pre-treatment score of 35 out of 40.

Based on Schröder et al.'s (2013) diagnostic criteria for misophonia, at the end of treatment and at 6-month follow-up, Zara no longer met any of the six criteria for misophonia. Her overall symptom level from pre- to post treatment improved on all quantitatively outcome measures collected (i.e. the A-MISO-S and the two scores from the Misophonia Questionnaire - the Misophonia Total Score and the Misophonia Symptoms Severity Scale) (See Table 7). Her

CBT TREATMENT OF MISOPHONIA CASE

reduction in symptoms from pre-treatment to post-treatment was both clinically significant as well as being statistically significant. Using a two-way, paired-samples t-test, the mean A-MISO-S score at pre-treatment ($M = 3.67$, $SD = 0.52$) was significantly worse (i.e. higher) than the mean A-MISO-S score at post-test (at session 10) ($M = 0.67$, $SD = 0.52$); $t = 11.62$, $df = 5$, $p < .0001$. A separate two-way, paired-samples t-test was also completed for the MQ Total Score, with the mean score at pre-treatment ($M = 3.18$, $SD = 1.29$) being significant higher (i.e. worse or more symptoms) than the mean at post-treatment ($M = 1.1$, $SD = 0.86$); $t = 8.25$, $df = 16$, $p < .0001$. The change on the A-MISO-S represents an 82% decrease in symptoms and a 66.7% reduction in symptoms on the MQ Total Score. According the Schröder et al.'s (2013) qualitative range for the A-MISO-S, her Total Symptom Score dropped from the Extreme range to the Subclinical range. Her reduction in symptoms was also maintained on the A-MISO-S and the Misophonia Total Score from post-treatment to 6-months post-treatment (See Table 8). The statistically significant reduction in symptoms was supported by clinical observation and Zara descriptions of her functioning. Zara reported that by the end of treatment she was no longer avoiding any persons or situations out of concern that she would encounter trigger sounds, and during the final four weeks of treatment she reported that she had not engaged in any instances of verbal or physical aggressive behavior

Evaluation of Treatment Goals. A mixed-method presentation of treatment goal 1 results, reduction in inappropriate coping behavior and increase in effective coping skill is presented in Table 9. To measure changes in inappropriate coping behavior and emotions, I looked to the MQ-P2 scale. At pre-treatment, Zara engaged in a high number of inappropriate coping responses and emotions. There are no published norms for the MQ-P2, but Zara received a score of 35 out of 40 at pre-treatment and at post-treatment (session 10) she had a score of 8, a

CBT TREATMENT OF MISOPHONIA CASE

77% reduction, with her score improving slightly at 6-month follow-up (where she scored herself at a 7). Using a paired, two-way t-test, as shown in Table 7 (See the row MQ-P2 Summary of Items), the pre-post change represents a statistically significant reduction (i.e. improvement) in her average ratings on the measure from $M = 3.5$, $SD = 1.1$ at pre-treatment to $M = 0.8$, $SD = 0.42$ at post-treatment ($t = 11.31$, $df = 9$, $p < 0.0001$). Table 8 includes a paired, two-way t-test, that compared changes in her scores from post-treatment to 6-months-post treatment. There were no significant differences from post treatment to 6-months-post ($t = -1$, $df = 16$, $p = 0.332$), suggesting that her gains were maintained at 6-months post treatment. While these changes look at overall differences in the MQ-P2, Table 5 provides a detailed breakdown of changes in her use of individual coping behaviors. I used a table similar to this one throughout treatment where a similar color coding was used to visualize worsening or improvement in use of specific undesired and inappropriate coping behaviors. Zara's use of effective coping skills was monitored primarily by reviewing her homework, while also supported by her self-report and by observations during exposure sessions. Zara was diligent and consistent in completing her homework each week, which included the completion of a thought record.

The second goal was to reduce sensitivity to triggers and distress caused by triggers. Mixed method data used to evaluate changes in her distress and sensitivity is reported in Table 10 with her SUDS score changes reported in Table 2. On the MQ-P1 scale (See Appendix A-2) Zara was asked to rate her sensitivity to common misophonic triggers "in comparison to other people." While Zara indicated that she was more "sensitive" than others to a variety of sounds, she only produced the misophonic response when she encountered eating sounds. Thus, in evaluating her sensitivity to trigger sounds, I focused on changes in her response on item 1 (i.e. "eating sound" such as chewing, swallowing, lip smacking, slurping). MQ-P1 items were scored

CBT TREATMENT OF MISOPHONIA CASE

on a Likert scale (0-4) with 0 = Not at all true (No sensitivity) to 4 = Always True (Frequent Sensitivity). Her pre-post scores are presented in Table 3. Zara endorsed that there was improvement in her sensitivity to these trigger sounds (on MQ-P1, Item 1) from pre-treatment “Always True” (4) to post-treatment “Sometimes True” (2). Since another clinician did the follow up, I was not able to ask additional questions regarding her endorsement of an increase in her sensitivity from “Sometimes True” (2) at post-treatment to “Always True” (4) at 6-month follow-up. Based on Zara’s response at 6-month follow-up, it appears as though her sensitivity to sounds increased over time. There are many reasons why this sensitivity increased, including the re-emergence of the conditioned response to the trigger sounds, the possibility that she remained sensitive throughout treatment and under-reported, or there is an undetermined underlying neurological cause.

While Zara maintained at least some level of sensitivity to trigger sounds throughout treatment, her distress in response to triggers improved from pre to post treatment, and her gains were maintained at 6-month follow-up. Functionally, Zara’s improvement in distress is best captured by the changes from her initial description of symptoms at pre-treatment to her description of her distress at post-treatment. During the intake, Zara described feeling “intense physical discomfort,” “out of control,” and “overwhelming” anger and disgust when exposed to triggers. On the last day of treatment, she described her experience in the presence of most feared triggers as “boring” and that her previous distress reaction to triggers was “silly.” On the A-MISO-S Question 3 (“How much distress do the misophonic triggers cause you?”) she rated herself at “Extreme” (4) at pre-treatment and at “Mild” (1) at post treatment and “Mild” (1), again, at 6-month post treatment. On MQ-P2, Item 4 (“Once you are aware of the sound(s), because of the sound(s), how often do you... become anxious or distressed”) she endorsed

CBT TREATMENT OF MISOPHONIA CASE

“Always True” (4) at pre-treatment and “Rarely True” (1) at post-treatment and at 6-months post treatment. Following the end of each exposure exercise Zara re-rated her SUDS rating for that triggering situations. While she had several pre-exposure SUDS ratings of 90 or higher, at the end of treatment she rated the most distressing sounds/situation with a SUDS rating of 30.

Zara’s third treatment goal was to improve her overall functioning. This included a reduction in her avoidance behavior associated with triggers that interfered with her social life. Measures of her functioning are presented in Table 11 with her CCAPS-62 scores, providing a measure of her psychological functioning presented in Table 6. At the beginning of treatment Zara reported that she avoided a variety of locations, situations and people. These included the common room in her dorm-room suite, the cafeteria, and restaurants with friends. She had also begun to avoid enclosed places such as elevators and escalators. By the end of treatment, she reported that she was no longer fearful of being in any of these locations and that she had tolerated being in the presence of her friends while they slurped and ate crunchy foods. The MQ-P3 provides an excellent single-item rating that reflects overall sensitivity to triggers and interference caused by triggers. Zara went from rating herself at a 12 (“Severe”) at pre-treatment to a 4 (“Mild”) at post-treatment and 3 (“Very Mild”) at 6-month follow-up. The description that accompanied the “Very Mild” rating is as follows: “Minimal sensitivity; within range of normal or very mild sound sensitivities: I spend little time resisting or being affected by my sound sensitivities. Almost no or no interference in daily activities.” This description and the progression over the course of treatment on the MQ-P3 is similar to changes in her ratings on the A-MISO-S Item 2 (“How much do these misophonic triggers interfere with your social, work or role functioning?”) and Item 6 (“Have you been avoiding doing anything, going any place, or being with anyone because of your misophonia?”). She endorsed significant impairment (scoring

CBT TREATMENT OF MISOPHONIA CASE

herself at a “4”) on both items at pre-treatment and by post-treatment she rated the interference or avoidance caused by triggers as either “Mild” or “None” for post-treatment and 6-months post treatment.

Zara’s scores on the CCAPS-62 across the course of treatment are presented in Table 4. As discussed earlier, the CCAPS-62 is a normed measure that is designed as a tool for monitoring symptoms and overall psychological functioning but is not used as a screener for diagnosis. At pre-treatment, Zara presented with a number of symptoms of generalized and social anxiety. Her general anxiety and social anxiety symptoms decreased over the course of treatment, although her social anxiety had a smaller improvement than her general anxiety. Her symptoms of depression and “eating concerns” also improved. Most relevant to her misophonia, Zara reported a significant reduction in her “Hostility” subscale. This included improvements on items related to her desire to break or smash things, feelings of irritability, and fear that she might lose control and act violently. Zara’s improvement on the CCAPS matches her self-report that she felt more optimistic about the future, that her overall free-floating anxiety had decreased, and that she was better able to regulate her emotions. Her levels of social anxiety at the end of treatment were lower than at pre-treatment but suggest that she continued to exhibit subclinical social anxiety after the misophonic symptoms had reduced.

Evaluation of Non-Specific Treatment Factors

Zara was an ideal candidate for the treatment that was implemented. She was communicative about the stigma attached to mental health intervention in her home culture and expressed other reservations about treatment. Her candor allowed these issues to be directly addressed, and this set a foundation for a strong therapeutic alliance. Zara responded positively to the use of motivational interviewing techniques, and in particular providing her with many

CBT TREATMENT OF MISOPHONIA CASE

open-ended questions, affirming and validating statements and reflections of her descriptions of her symptoms appeared to be helpful in developing rapport, motivation and trust. Her humility, intelligence, strong executive functioning skills and work ethic helped her to quickly learn and apply new skills. Evidence of her motivation, buy-in, and effort was reflected in her 100% attendance record for therapy (except for one session rescheduled in advance), her early arrival for appointments to complete rating scales, and her completion of homework each week. Zara's behavior related to the audiological exam was an anomaly given our other interactions. This could have been explored in more depth, particularly at the end of treatment when rapport was strongest. In session, she was attentive and collaborative. Zara's ability to tolerate distress was also a key element in her success and allowed the therapy process to move swiftly enough to begin exposure exercises by the fifth session.

Reflections on Guiding Conceptualization and Mechanisms of Change

In my initial guiding conceptualization, I hypothesized that misophonic symptoms stemmed from neurological and cognitive vulnerabilities that were precipitated, caused and maintained by behavioral and cognitive factors. These included the pairing of the trigger sounds with a conditioned aversive somatic nervous system response, errors in interpretation of the sensations associated with the somatic nervous system response and the social context of the trigger sounds, negative reinforcement of the inappropriate coping behavior, and assumptions (e.g. anxiety) about encountering triggers in the future that leads to avoidance.

Based on my guiding conceptualization, I hypothesized that the initial aversive somatic nervous system reflex was a conditioned response that was maintained its temporal proximity to the conditioned (i.e. the trigger sound). I anticipated that by completing graded and prolonged exposure to the triggers that Zara would habituate to the sounds; there would be improved

CBT TREATMENT OF MISOPHONIA CASE

discrimination between the unconditioned and conditioned stimuli and the trigger sounds would no longer predict the conditioned response. Over time, as the association between the trigger sound and the conditioned somatic response weakened the intensity of this response would diminish and undergo extinction. My initial hypothesis about exposure was that the mechanism of change in exposure would be physiological and behavioral habituation. When Zara's self-report of distress (See Table 10, MQ-P2, Item 4, and A-MISO-S, Item 3) and sensitivity (See Table 10, MQ-P1, Item 1) in response to trigger sounds decreased (i.e. improved) at the end of treatment, I had assumed that this change was primarily the result of habituation and the de-pairing of the conditioned stimulus and conditioned response. I anticipated that in order for Zara to maintain these gains, she would need to continue to complete prolonged exposures. This is the reason that I recommended that she continue to use the PowerPoint exposure stimuli and to conduct en-vivo exposures as part of her maintenance plan. At 6-months post-treatment I was surprised to hear that Zara reported that her "sensitivity" to triggers (See Table 10, MQ-P1, Item 1) had re-emerged while her distress and anger levels continue to remain at post treatment, mild or subclinical levels. This outcome suggests that the most potent and durable mechanisms of change in the exposure exercises was not habituation. For Zara, she entered the exposure exercises with intense fears and apprehensions about being "out of control," injuring herself or others, embarrassing herself and not being able to cope. During the course of the exposures, she had the opportunity to test out these expectations, and it appears that the "expectancy violation," where she learned that her expectations were inaccurate, is what were associated with her shifts in her perspective and assumptions what were maintained at the follow-up. While, initially surprising that habituation did not appear to cause the change in her functioning, Zara's outcome is similar to the finding in the Bernstein et al. (2013) case study, where their client at the end of

CBT TREATMENT OF MISOPHONIA CASE

treatment continued to be “annoyed” by triggers, but they no longer avoided them or found them distressing.

While the exposure phase of treatment was associated with the sharpest improvement in functioning and decrease in distress, it is not possible to de-tangle the effects of other specific and non-specific intervention components. Zara demonstrated excellent skills and acumen in effectively utilizing cognitive restructuring techniques. She reported decrease in frustration, irritation and anger in the presence of trigger sounds prior to completing in-session, structured exposure exercises. The cognitive restructuring exercises appeared to be effective in helping Zara reframe and challenge her beliefs about the selfishness and malice of others and increase her willingness to test her assumptions related to her inability to cope with trigger sounds.

Comparisons to Previously Published Cases

The current case adds to the case study and treatment research on misophonia as well as contributing to the growing documentation of this disorder in the peer-review literature. The case serves as an additional example of a CBT intervention that includes cognitive restructuring and graded exposure being effective in treating an individual with misophonia. This case also addresses several of the limitations of other similar interventions in that there were multiple misophonia outcome measures, a multi-domain measure of psychological functioning, weekly data collection, and a detailed account of the case formulation and course of treatment.

Zara’s improvement in misophonia symptoms compares favorably with the outcomes from other CBT case studies and interventions in the peer review literature (McGuire et al., 2015; Reid et al., 2016; Schröder et al., 2017). Zara’s 82% improvement in her A-MISO-S score, which was maintained at 6-months-post treatment, is remarkable when compared to the outcome

CBT TREATMENT OF MISOPHONIA CASE

from the only large scale, controlled treatment study (Schröder et al, 2017) wherein 48% of patients had an improvement in A-MISO-S score of 30% or more.

Limitations

Over the course of this research, I identified limitations that might limit its usefulness for clinicians seeking guidance in treating patients with misophonia. The current study only had one subject and, thus, the inferences that can be made about treating the disorder are limited in scope. Other clinicians should also keep in mind that misophonia is a condition that is still being defined and for which no evidence-based interventions have been established. As such, the clinician borrowed from a number of available techniques that have been associated with improvement with the condition. While the client met treatment goals, it is not clear which aspects of treatment were the most critical to her success. Also, given that I adapted protocols for other conditions (e.g. OCD) and utilized components of multiple manualized protocols rather than a single manual, it is not clear whether Zara received a “full dose” of these treatments or whether the interventions were administered with fidelity.

Several other limitations also need to be addressed. A significant limitation was the fact that I was not able to rule out a physical audiological cause of her symptoms, which leave open the possibility that her presentation was of medical. Despite, efforts to use of a number of standardized and non-standardized measures for the purposes of assessment, given that the researcher was also the clinician, social desirability bias, that is, the client’s desire to please the researcher, may have influenced scores on self-report measures. With regard to the particular rating scales, the A-MISO-S has not been validated and is considered more conceptual in nature. Currently, there are no published norms for the MQ. While both measures yield useful information, research is needed before they are widely used to assess misophonia. The CCAPS-

CBT TREATMENT OF MISOPHONIA CASE

62 is useful as a screening tool for counseling centers, but it is limited as a diagnostic tool. This study case could have been strengthened if a more robust multi-domain measure of psychological function was used. Finally, some outcome measures in the case study were based on descriptive self-report rather than more objective physiological measures of her distress. Due to the evidence supporting possible neurologic correlates of misophonia (Jastreboff & Jastreboff, 2014; Kumar et al., 2017), research that includes physiological markers might yield useful information for future researchers and clinicians with interest in misophonia. The outcome data also could have been strengthened if there were behavioral data on number or percentage of situations avoided or left due to trigger sounds rather than relying on individual items from the rating scale.

CHAPTER IX

Discussion

Zara's case study was intended to provide a detailed and rigorous account of intervention for misophonia. Despite the level of detail, it is important for readers to remember that misophonia, despite the growing research support, is still not well understood. For the purposes of this case we utilized the diagnostic criteria provided by Schröder et al. (2013), but it is still unclear whether misophonia represents a unique psychiatric, neurological, or audiological disorder. If it is indeed a unique psychiatric disorder, then researchers and clinicians are still at early stages of uncovering the causes and maintenance of symptoms. In Zara's case, I attempted to synthesize the existing literature based both on its underlying neurological vulnerabilities and the leading theories regarding behavioral and cognitive factors that maintain the disorder.

The rate of research on misophonia is rapidly increasing and I suspect that over the next few years, my conceptualization will require updates. Regardless of what future researchers and clinicians uncover about misophonia, my hope is that the current case study will provide insight into what caused and maintained the symptoms in Zara's case, and this insight can contribute to those who are seeking to better understand this disorder and treat patients who present with misophonic symptoms.

As a relatively new therapist, Zara's case was challenging. My background and training have been in providing more structured behavioral and manualized treatments. Working with a client who does not fit cleanly into a DSM-5 diagnostic category (American Psychiatric Association, 2013) demonstrated the importance of the case-formulation model (Persons, 2008) and how a therapist's ability to be flexible and a professional consumer of research are essential skills needed for providing evidence-based treatment for clients. While I support additional

CBT TREATMENT OF MISOPHONIA CASE

funding for randomized controlled trials, my hope in you reading this case is that the value of the Pragmatic Case Study format shines through (Fishman, 2013). As others community-based clinicians come across new disorders or conditions that are not well understood, my hope is that we work together a collective body and use the Pragmatic Case Study to share the successes and challenges of our journeys.

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TABLES

Table 2

CBT Treatment Studies in Misophonia Literature

Author	Subject(s), Dx, and Symptoms	Trigger Sounds	# of sessions	Outcome Measures	Components & Techniques Described	Outcomes	Commentary/Limitation
Reid et al. (2016)	<ul style="list-style-type: none"> 14 y/o female Comorbid OCD, MDD, specific phobia and ADHD) Strong anger and anxiety 	<ul style="list-style-type: none"> Pen clicking, throat clearing, and squeaky noises. 	<ul style="list-style-type: none"> 14 sessions Note: Only Sessions 9 & 10 focused on misophonia 	<ul style="list-style-type: none"> A-MISO-S CY-BOC Collected at sessions: 4, 8, 12, 14 & 3-mo post tx 	<ul style="list-style-type: none"> Psycho-ed Trigger SUD hierarchy Repeated graded exposure with response prevention. Cognitive restructuring 	<ul style="list-style-type: none"> <u>A-MISO-S</u> (59% reduction T0 to T2) <ul style="list-style-type: none"> T0 (Session 4): 17 (Severe) T1 (Session 14): 7 (Mild) T2 (3-Mo Post Tx): 4 (Subclinical) <u>CY-BOC</u> (71% reduction T0 to T2) <u>Qualitative</u>: Reduced avoidance and distress. 	<ul style="list-style-type: none"> Intervention focused on treating OCD symptoms. Client received CBT therapy for depression between session 14 and 3-mo follow up Complicated psychological presentation.
McGuire et al. (2015)	<ul style="list-style-type: none"> 17 y/o Caucasian female No comorbid dx Irritability, anxiety, avoidance and school refusal 	<ul style="list-style-type: none"> Sniffing, heavy breathing increased symptoms to family 	<ul style="list-style-type: none"> 10 sessions 	<ul style="list-style-type: none"> Misophonia Questionnaire (MQ) MQ Symptom Severity Scale 	<ul style="list-style-type: none"> Psycho-education Develop trigger SUDS hierarchy, Gradual, repetitive, and prolonged exposures with response prevention, Cognitive restructuring 	<ul style="list-style-type: none"> <u>MQ Total Score</u>: 32% Improvement: 55 (Pre-tx) to 37 (Post-tx) <u>MQ Symptom Severity Scale</u>: 41% Improvement Pre-Post: 12 (“Severe”) to Post-tx 4 (“Moderate”) <u>Qualitative</u>: “Marked reduction in misophonia symptoms after treatment.” No longer interfered with family functioning. 	<ul style="list-style-type: none"> Treatment was effective for both patients. Patients varied in age and symptom severity Limited in details of assessment and techniques used in cognitive restructuring. Variability in session length between patient – present challenges for replicating.
	<ul style="list-style-type: none"> 11 y/o Hispanic female No comorbid dx Angry and aggressive outburst, internalized distress. 	<ul style="list-style-type: none"> Slurping, lip smacking, breathing, tapping. 	<ul style="list-style-type: none"> 18 sessions 	<ul style="list-style-type: none"> See above 	<ul style="list-style-type: none"> See above 	<ul style="list-style-type: none"> <u>MQ Total Score</u>: 19% Improvement on: 31 (Pre-tx) to 25 (Post-tx) <u>MQ Symptom Severity Scale</u>: 33% Improvement Pre-Post: 6 (“Mild”) to Post-tx 4 (“Mild”) <u>Qualitative</u>: “Marked reduction in misophonia symptoms after treatment.” No longer interfered with family functioning. 	

CBT TREATMENT OF MISOPHONIA CASE

Table 2 (continued)

Author	Subject(s), Dx, and Symptoms	Trigger Sounds	# of sessions	Outcome Measures	Components and Techniques Described	Outcomes	Commentary/Limitation
Muller et al. (2018)	<ul style="list-style-type: none"> • 14 y/o female • Subclinical trichotillomania and OCD • Disgust, Anger, Anticipatory Anxiety • Avoidance of social eating, difficulty concentrating, dig fingernails into air to tolerate distress 	<ul style="list-style-type: none"> • Eating behaviors of family, that then increased over time 	<ul style="list-style-type: none"> • 24 sessions • Frequency: weekly or bi-weekly with long breaks over 3 years 	<ul style="list-style-type: none"> • No rating scales or behavioral data. • Observational info from in-session and self-report information from client and parents re: out of session functioning 	<ul style="list-style-type: none"> • Psycho-education • Motivation enhancement, • Develop SUD hierarchy • Prolonged in-vivo exposure, • Habit-reversal for eyelash pulling, • "Cognitive processing" pre and post exposure to challenge irrational beliefs. 	<ul style="list-style-type: none"> • <u>Qualitative</u>: Report of marked improvement in family functioning, no avoidance, report of reduced distress in presence of sounds. 	<ul style="list-style-type: none"> • Qualitative reports from authors indicate that there was "marked" improvement in functioning and reduction in symptoms. • Limitations: No quantitative outcome measures or data collected, inconsistent session regularity.
Bernstein et al. (2013)	<ul style="list-style-type: none"> • 19 y/o female • No comorbid dx • disgust and intense irritation • Mimicked family and peers • "Inability to enjoy social meals, and avoidance of social events." 	<ul style="list-style-type: none"> • slurping, swallowing, and chewing. 	<ul style="list-style-type: none"> • 6 Weekly sessions 	SCID, Stages of Change Questionnaire, BAI, BDI, BHI.	<ul style="list-style-type: none"> • psycho-ed • SUDS Hierarchy • Exercise • Cognitive therapy techniques: challenging of assumption/beliefs • Socratic questioning • Redirecting Attention • Exposure 	<ul style="list-style-type: none"> • "Liz still found chewing noises unpleasant, but these triggers no longer impaired her social or occupational functioning." • Reduction in inappropriate coping (mimicking, sighing, eye rolling, 	<ul style="list-style-type: none"> • One participant. • Gains stable at 4 months • Limited detail regarding where procedure was adapted

CBT TREATMENT OF MISOPHONIA CASE

Table 2 (continued)

Author	Subject(s), Dx, and Symptoms	Trigger Sounds	# of sessions	Outcome Measures	Components and Techniques Described	Outcomes	Commentary/Limitation
Schröder et al. (2017)	<ul style="list-style-type: none"> • 90 patients (65 female, 25 male) • Average age 35.8 (SD=12.2) • Average of “Moderate” Misophonia (A-MISO-S Score of 13.6 at pre-treatment) 	<ul style="list-style-type: none"> • 69% triggered by eating sounds 	<ul style="list-style-type: none"> • 7 or 8 weekly or biweekly sessions 	<ul style="list-style-type: none"> • A-MISO-S • Symptom Checklist-90 	<ul style="list-style-type: none"> • Treated in closed groups of 7-9 patients • “Each therapy day offered the patients a four-hour program of CBT and PMT (Psychomotor therapy). • Task concentration exercises • Counterconditioning • Stimulus manipulation • Relaxation exercises 	<ul style="list-style-type: none"> • 48% showed significant reduction (defined as 30% or greater reduction on A-MISO-S) at end of tx. 	<ul style="list-style-type: none"> • Clinicians were not blind to condition of patients. • Lack of measure of functioning • Inconsistency with the number of sessions. • Limited details regarding “CBT” treatment.

CBT TREATMENT OF MISOPHONIA CASE

Table 3

Exposure SUDS Hierarchy (Crunching Trigger Sound)

Rank Order	SUDS Number	SUDS Pre	SUDS Post
1	Reading a book with headphones on	0	N/A
2	Imagining someone eating chips	30	10
3	Imagine friend eating chips	40	10
4	Imagine mother eating chips	50	10
5	Watch video of someone eating chips (Volume low)	60	20
6	Watch video of someone eating chips (Volume med)	65	10
7	Watch video of someone eating chips (Volume high)	70	10
8	Sound of many 6 chips being eaten at once	75	20
<u>9</u>	<u>Therapist holds chip bag (First in-person)</u>	<u>65</u>	<u>5</u>
10	Therapist puts chips in mouth	75	20
11	Therapist chews chips loudly	80	10
12	Therapist and other confederate chew chips at same time	75	10
13	Confederate chews chips in hallway	82	20
14	<i>Friend chews chips in dorm room suite</i>	85	20
15	<i>Friend chews chips in cafeteria</i>	90	--
16	<i>At home in with mother chewing chips</i>	95	--

Key:

- 1) **For #9: SUDS rating is lower due to first in-person exposure**
- 2) ***Exposure not completed during treatment***

CBT TREATMENT OF MISOPHONIA CASE

Table 4

Session-to-Session: Overall Misophonia Symptoms

Misophonia Questionnaire	Pre-Tx	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	6-Mo
Misophonia Questionnaire Total												
Score (MQ-P1 and P2)												
MQ Total Score: (Sum of Parts 1 and 2; Out of 68)	54	51	—	42	—	41	—	27	—	23	18	21
MQ-P1: Misophonia Symptom Scale (Out of 28)	19	16	—	14	—	15	—	11	—	11	10	14
Part 1, Item #1: People eating (e.g. chewing swallowing, lip smacking, etc.) (Out of 4)*	4	4	—	4	—	4	—	2	—	3	2	4
MQ-P2: Misophonia Coping Emotions & Behaviors Scale (Out of 40)	35	35	—	28	—	26	—	16	—	12	8	7
MQ-P3: One-Item Severity of Sound Sensitivity Scale (Part 3)												
MQ-P3: (Out of 15) Score and Qualitative Range	12 <i>Severe</i>	11 <i>Severe</i>	—	11 <i>Severe</i>	—	9 <i>Moderate</i>	—	6 <i>Mild</i>	—	5 <i>Mild</i>	4 <i>Mild</i>	3 <i>Very Mild</i>
Amsterdam Misophonia Scale	Pre-Tx	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	6-Mo
A-MISO-S Total Symptom Score (Out of 24) and Qualitative Range	23 <i>Extreme</i>	22 <i>Extreme</i>	20 <i>Extreme</i>	19 <i>Severe</i>	19 <i>Severe</i>	19 <i>Severe</i>	13 <i>Moderate</i>	12 <i>Moderate</i>	9 <i>Mild</i>	4 <i>Subclinical</i>	4 <i>Subclinical</i>	4 <i>Subclinical</i>

Key:

1) *MQ-P1: "In comparison to other people, I am sensitive to the sound of_____"; Scoring Rubric: 0=Not true at all; 1=Rarely True;

2) Color Guide:

XX	Baseline	XX	Improved	XX	Same	XX	Worse	—	No data
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CBT TREATMENT OF MISOPHONIA CASE

Table 5

Session-to-Session: Amsterdam Misophonia Scale

Amsterdam Misophonia Scale^	Pre-Tx	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	6-Mo
A-MISO-S Total Symptom Score (Out of 24) and Qualitative Range	23 <i>Extreme</i>	22 <i>Extr</i>	20 <i>eme</i>	19 <i>Sever</i>	19 <i>Sev</i>	19 <i>Seve</i>	13 <i>Mode</i>	12 <i>Mod</i>	9 <i>Mil</i>	4 <i>Subc</i>	4 <i>lin</i>	4 <i>Subcl</i>
1. How much of your time is occupied by misophonic triggers?	4	4	4	4	3	3	3	2	2	1	1	1
2. How much do these misophonic triggers interfere with your social, work or role functioning?	4	3	4	3	3	4	3	2	3	1	1	0
3. How much distress do the misophonic triggers cause you?	4	4	4	4	3	3	2	2	1	1	1	1
4. How much effort do you make to resist the (thoughts about the) misophonic triggers?	3	3	2	2	3	3	1	2	1	0	0	1
5. How much control do you have over your thoughts about the misophonic triggers?	4	4	3	3	3	3	2	2	1	0	1	1
6. Have you been avoiding doing anything, going any place, or being with anyone because of your misophonia?	4	4	3	3	4	3	2	2	1	1	0	1

Key:

- 1) ^ A-MISO-S Scoring Rubric: 0= None; 1=Mild; 2=Moderate, Sometimes True; 3=Severe; 4=Extreme
- 2) *MQ P1: "In comparison to other people, I am sensitive to the sound of_____";
Scoring Rubric: 0=Not true at all; 1=Rarely True; 2=Sometimes True; 3=Often True; 4=Always True
- 3) Color Guide:

XX	Baseline	XX	Improved	XX	Same	XX	Worse	—	No data
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CBT TREATMENT OF MISOPHONIA CASE

Table 6

Session-to-Session: Misophonia Questionnaire: (MQ-P2) Coping Behavior and Emotions

Misophonia Questionnaire Part 2 (MQ-P2): Coping Emotions and Behaviors Scale**	Pre- Tx	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	6- Mo	Pre-Post (Paired T- Test):
MQ-P2 Summary Score (Out of 40)	35	35	—	28	—	26	—	16	—	12	8	7	<.0001*
Item 1. Leave the environment to a place where the sound(s) cannot be heard anymore?	4	4	—	3	—	3	—	2	—	1	1	1	--
Item 2. Actively avoid certain situations, places, things, and/or people in anticipation of the sound(s)?	4	4	—	3	—	3	—	2	—	1	1	1	--
Item 3. Cover your ears?	4	4	—	3	—	4	—	2	—	2	1	1	--
Item 4. Become anxious or distressed	4	4	—	4	—	3	—	2	—	2	1	1	--
Item 5. Become sad or depressed?	4	4	—	3	—	2	—	2	—	1	1	1	--
Item 6. Become annoyed?	4	4	—	4	—	3	—	2	—	2	1	2	--
Item 7. Have violent thoughts?	4	4	—	3	—	3	—	2	—	1	1	0	--
Item 8. Become angry?	4	4	—	4	—	3	—	2	—	1	1	0	--
Item 9. Become physically aggressive?	1	1	—	0	—	0	—	0	—	0	0	0	--
Item 10. Become verbally aggressive?	2	2	—	1	—	2	—	0	—	1	0	0	--

Key:

1) ** MQ P2 Directions: Once you are aware of the sound(s), because of the sound(s), how often do you: _____; Scoring

Rubric: 0= Never; 1=Rarely; 2=Sometimes; 3=Often, 4=Always

2) *p<.05

3) Color Guide:

XX	Baseline	XX	Improved	XX	Same	XX	Worse	—	No data
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CBT TREATMENT OF MISOPHONIA CASE

Table 7

Session-to-Session: Counseling Center Assessment of Psychological Symptoms – 62 (CCAPS-62)

CCAPS-62; T-Scores Reported)	Pre-Intake	Intake 1	Intake 2	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	6-Mo Post
Depression	59	---	---	---	---	---	---	48	---	---	40	---	46	---
Generalized Anxiety	73	---	---	---	---	---	---	56	---	---	49	---	48	---
Social Anxiety	64	---	---	---	---	---	---	55	---	---	48	---	58	---
Academic Concerns	38	---	---	---	---	---	---	32	---	---	32	---	36	---
Eating Concerns	50	---	---	---	---	---	---	45	---	---	44	---	43	---
Family Distress	48	---	---	---	---	---	---	44	---	---	37	---	37	---
Hostility	62	---	---	---	---	---	---	47	---	---	40	---	38	---
Substance Use	41	---	---	---	---	---	---	41	---	---	41	---	43	---

Key:

1) T-Scores with mean = 50, SD = 10

2) Higher scores = More severe symptoms and worse functioning

CBT TREATMENT OF MISOPHONIA CASE

Table 8

Pre-Post Treatment Outcomes

Outcome Measure	<u>Pre-Treatment</u>		<u>Post-Treatment</u>		<u>Pre - Post: Paired T-Test</u>			
	Mean	SD	Mean	SD	Mean Difference	t	df	p (two-tailed)
MQ Total Score (Sum of Parts 1 and 2)	3.18	1.29	1.1	0.86	2.06	+8.25	16	<.0001*
MQ Part 1: Misophonia Symptom Scale	2.7	1.5	1.6	1.1	1.14	+4.38	6	<.005*
MQ Part 2: Misophonia Coping Emotions and Behaviors Scale	3.5	1.1	0.8	0.42	2.67	+11.31	9	<.0001*
MQ Part 3: Single-Item Sensitivity Scale	12	N/A	4	N/A	8	N/A	N/A	N/A
A-MISO-S	3.67	0.52	0.67	0.52	3	+11.62	5	<.0001*

Key:

- 1) * p < .05
- 2) MQ Part 3: T-Test could not be completed due to scale being 1-Item
- 3) MQ = Misophonia Questionnaire
- 4) A-MISO-S = Amsterdam Misophonia Scale

CBT TREATMENT OF MISOPHONIA CASE

Table 9

Post-Treatment - 6-Month Post Treatment Outcomes

Outcome Measure	<u>Post-Treatment</u>		<u>6 Months - Post-Treatment</u>		<u>Post - 6 Months Post: Paired T-Test</u>			
	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>	<i>SD</i>	<i>Mean Difference</i>	<i>t</i>	<i>df</i>	<i>p (two-tailed)</i>
MQ Total Score (Sum of Parts 1 and 2)	1.1	0.86	1.29	1.1	-0.177	-1	16	0.332
MQ Part 1: Misophonia Symptom Scale	1.6	1.1	2.1	1.1	-0.571	-1.92	6	0.103
MQ Part 2: Misophonia Coping Emotions and Behaviors Scale	0.8	0.42	0.7	0.67	0.11	+0.55	9	0.597
MQ Part 3: Single-Item Sensitivity Scale	4	N/A	3	N/A	1	N/A	N/A	N/A
A-MISO-S	0.67	0.52	0.67	0.52	-0.167	-0.54	5	0.612

Key:

- 1) * $p < .05$
- 2) MQ Part 3: T-Test could not be completed due to scale being 1-Item
- 3) MQ = Misophonia Questionnaire
- 4) A-MISO-S = Amsterdam Misophonia Scale

CBT TREATMENT OF MISOPHONIA CASE

Table 10

Pre-Post-6 Mo.: Misophonia Questionnaire: (MQ-P2) Coping Behavior and Emotions (Goal 1)

Misophonia Questionnaire Part 2 (MQ P2): Coping Emotions and Behaviors Scale	Pre- Tx	Post -Tx	6-Mo Post Tx	Pre-Post: (2- Tailed T-Test)*	Qualitative Information
<u>MQ P2: Summary of Items 1-10**</u>	35	8	7	<.0001*	<p>At post treatment Zara reported that she was using a variety of coping skills to tolerate being in situations with trigger sounds and where she might encounter them. She reported that these included coping statement, cog restructuring, breathing techniques, mindful attention to breath, as well as continuing to listen to music.</p> <p>She noted that she no longer needed to use coping skills as often because of her different perspective on the intention of the perpetrator and her belief that she could cope even in the worse case situation.</p>
Item 1. Leave the environment to a place where the sound(s) cannot be heard anymore?	4	1	1	--	
Item 2. Actively avoid certain situations, places, things, and/or people in anticipation of the sound(s)?	4	1	1	--	
Item 3. Cover your ears?	4	1	1	--	
Item 4. Become anxious or distressed	4	1	1	--	
Item 5. Become sad or depressed?	4	1	1	--	
Item 6. Become annoyed?	4	1	2	--	
Item 7. Have violent thoughts?	4	1	0	--	
Item 8. Become angry?	4	1	0	--	
Item 9. Become physically aggressive?	1	0	0	--	
Item 10. Become verbally aggressive?	2	0	0	--	

Key:

1) ** MQ P2 Directions: Once you are aware of the sound(s), because of the sound(s), how often do you: _____; Scoring Rubric: 0=Never; 1=Rarely; 2=Sometimes; 3=Often, 4=Always

2) *p<.05

CBT TREATMENT OF MISOPHONIA CASE

Table 11

Pre-Post-6-Mo: Responses Related to Sensitivity & Distress Associated with Trigger Sounds (Goal 2)

	Pre-Tx	Post-Tx	6-Months Post Tx	Qualitative Information
Sensitivity to Trigger Sounds Measure				
<u>Misophonia Questionnaire, Part 1, Item#1***</u>				
1. People eating (e.g. chewing swallowing, lip smacking, etc.)	4	2	4	Zara reported that she was less sensitivity to triggers on the last day of therapy after completing exposures. She noted that she was less vigilant in searching for potential triggers and reactant to trigger when she encountered them outside of session. At 6-Months Post: She noted that again she was more sensitive to trigger sounds than others and that she found them to be more annoying that when treatment finished.
Distress Associated with Triggers Sounds Measure				
<u>A-MISO-S, Item#3^</u>				
3. How much distress do the misophonic triggers cause you?	4	1	1	Zara reported that her distress, anger/ disgust and impulsive urges to react had reduced by the end of treatment. She noted that her distress was even lower at 6-months. She noted that while she was sensitive to trigger sounds, she no longer got angry or felt intense disgust. At the end of treatment, her SUDS ratings were all lower than at pre-exposure as well.
<u>Misophonia Questionnaire, Part 2, Item#4**</u>				
4. Become anxious or distressed	4	1	1	

Key:

- 1) ***MQ P1 Directions: In comparison to other people, I am sensitive to the sound of _____;
Scoring Rubric: 0= Not true at all; 1=Rarely True; 2=Sometimes True; 3=Often True; 4=Always True
- 2) ** MQ P2 Directions: Once you are aware of the sound(s), because of the sound(s), how often do you: _____;
Scoring Rubric: 0= Never; 1=Rarely; 2=Sometimes; 3=Often, 4=Always
- 3) ^ A-MISO-S Scoring Rubric: 0= None; 1=Mild; 2=Moderate, Sometimes True; 3=Severe; 4=Extreme

CBT TREATMENT OF MISOPHONIA CASE

Table 12

Pre-Post-6 Mo. Avoidance and Interference Related to Triggers (Goal 3)

	Pre-Tx	Post-Tx	6-Months Post Tx	Qualitative Information
Overall Interference and Sensitivity				
<u>Misophonia Questionnaire: One-Item Severity of Sound Sensitivity Scale (Part 3)</u>				
MQ Part 3:One Misophonia Sensitivity Score (Out of 15) and <i>Qualitative Range</i>	12 <i>Severe</i>	4 <i>Mild</i>	3 <i>Very Mild</i>	Zara reported limited to no avoidance or interference in her life due to fear of encountering triggers.
Interference with social, work or role functioning				
<u>A-MISO-S, Item#2[^]</u>				
2. How much do these misophonic triggers interfere with your social, work or role functioning?	4	1	0	Zara reported limited to no avoidance or interference in her life due to fear of encountering triggers.
Avoidance associated with misophonic symptoms				
<u>A-MISO-S, Item# 6[^]</u>				
6. Have you been avoiding doing anything, going any place, or being with anyone because of your misophonia?	4	0	1	Zara reported limited to no avoidance or interference in her life due to fear of encountering triggers.

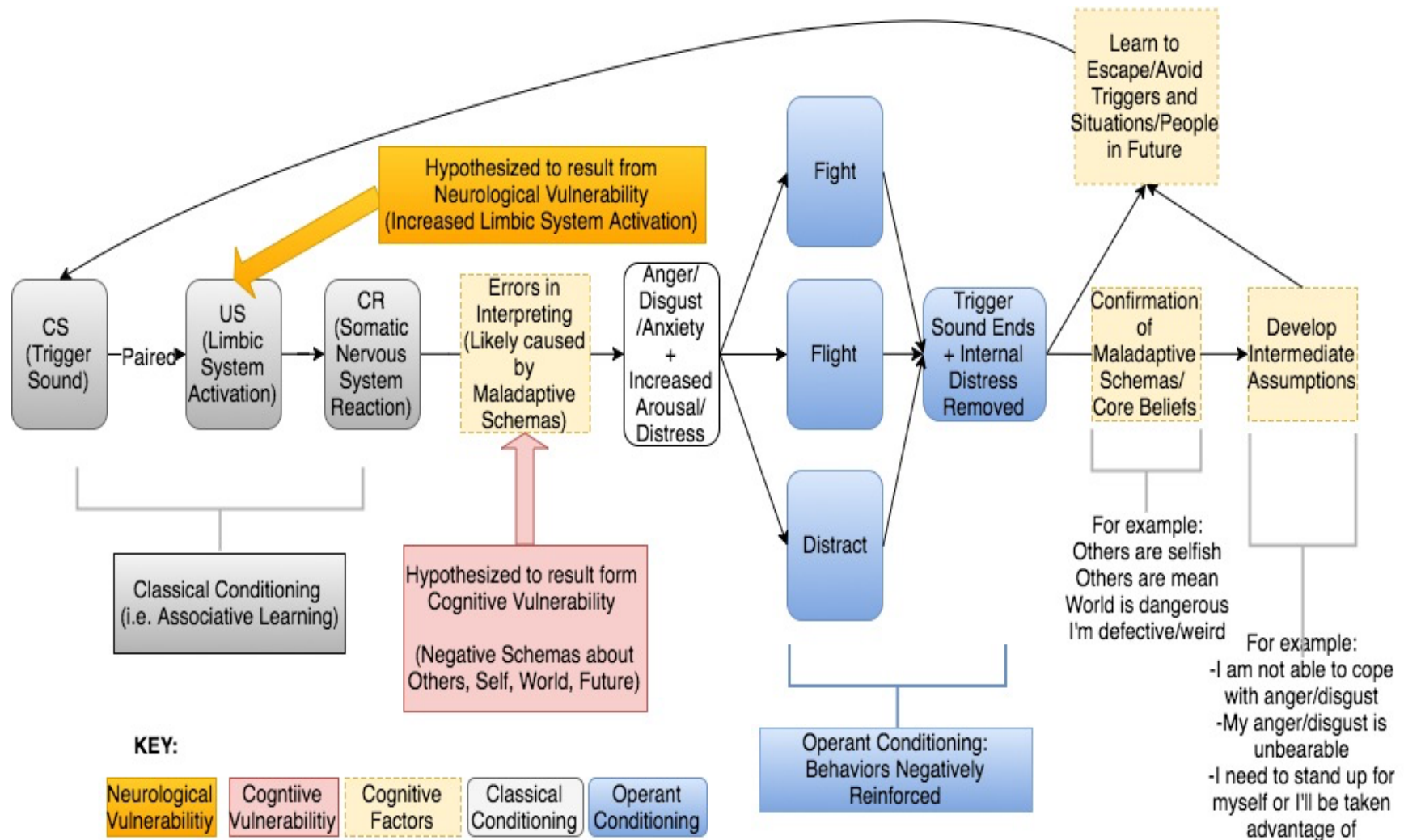
Key:

1) [^] A-MISO-S Scoring Rubric: 0= None; 1=Mild; 2=Moderate, Sometimes True; 3=Severe; 4=Extreme

FIGURES

Figure 1

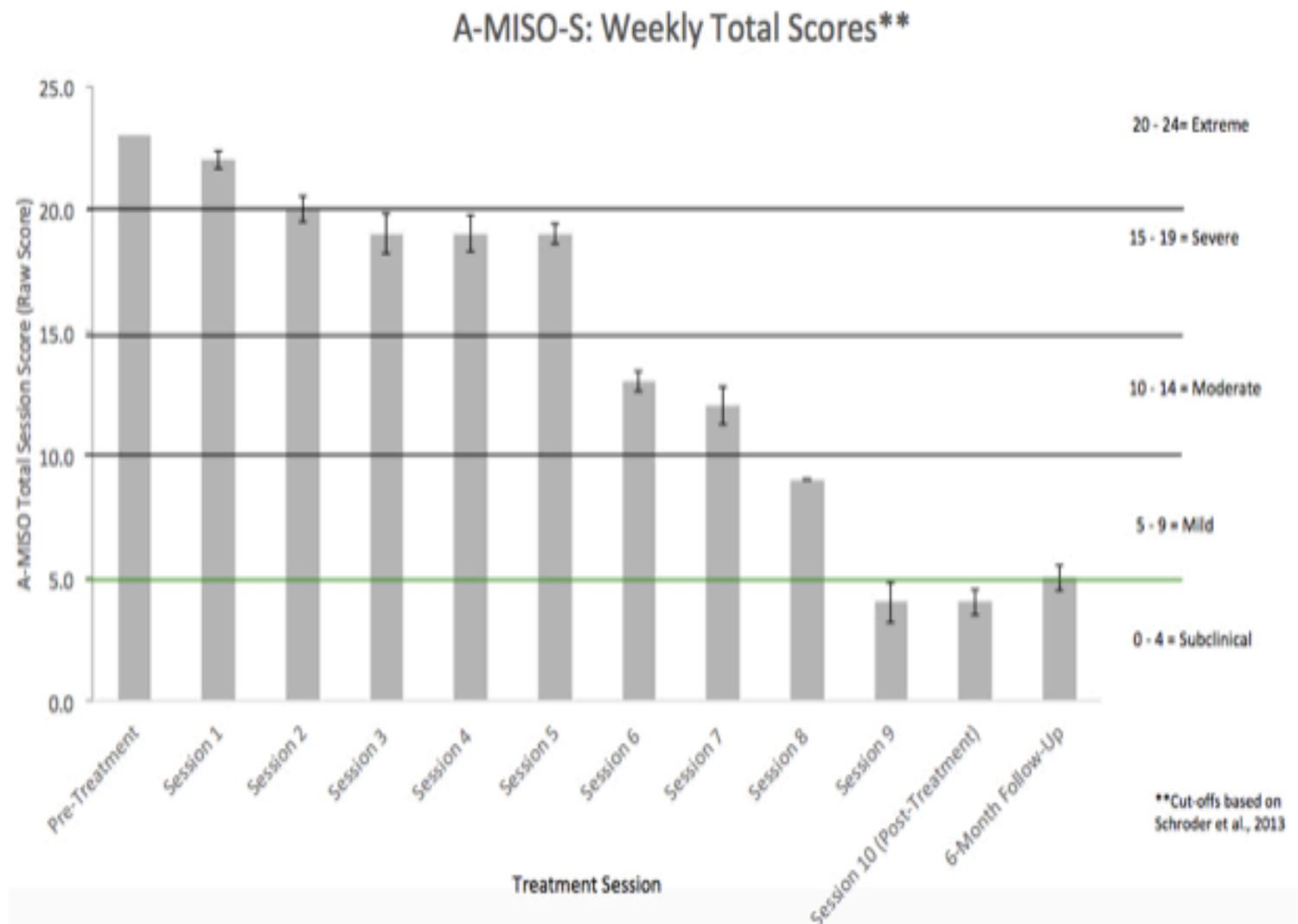
CBT Conceptual Model of Vulnerabilities and Mechanisms



CBT TREATMENT OF MISOPHONIA CASE

Figure 2

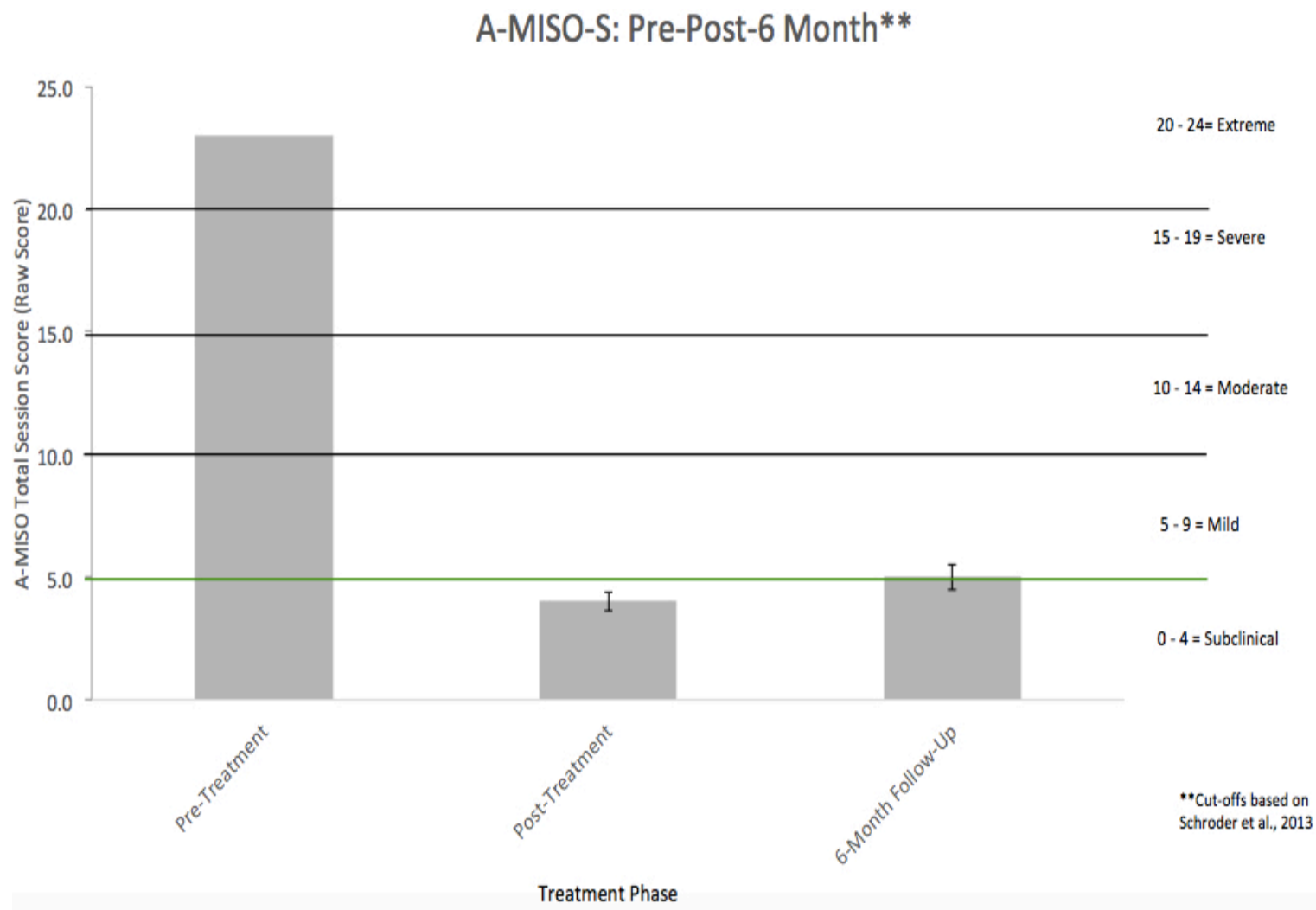
Session-to-Session: Amsterdam Misophonia Scale



CBT TREATMENT OF MISOPHONIA CASE

Figure 3

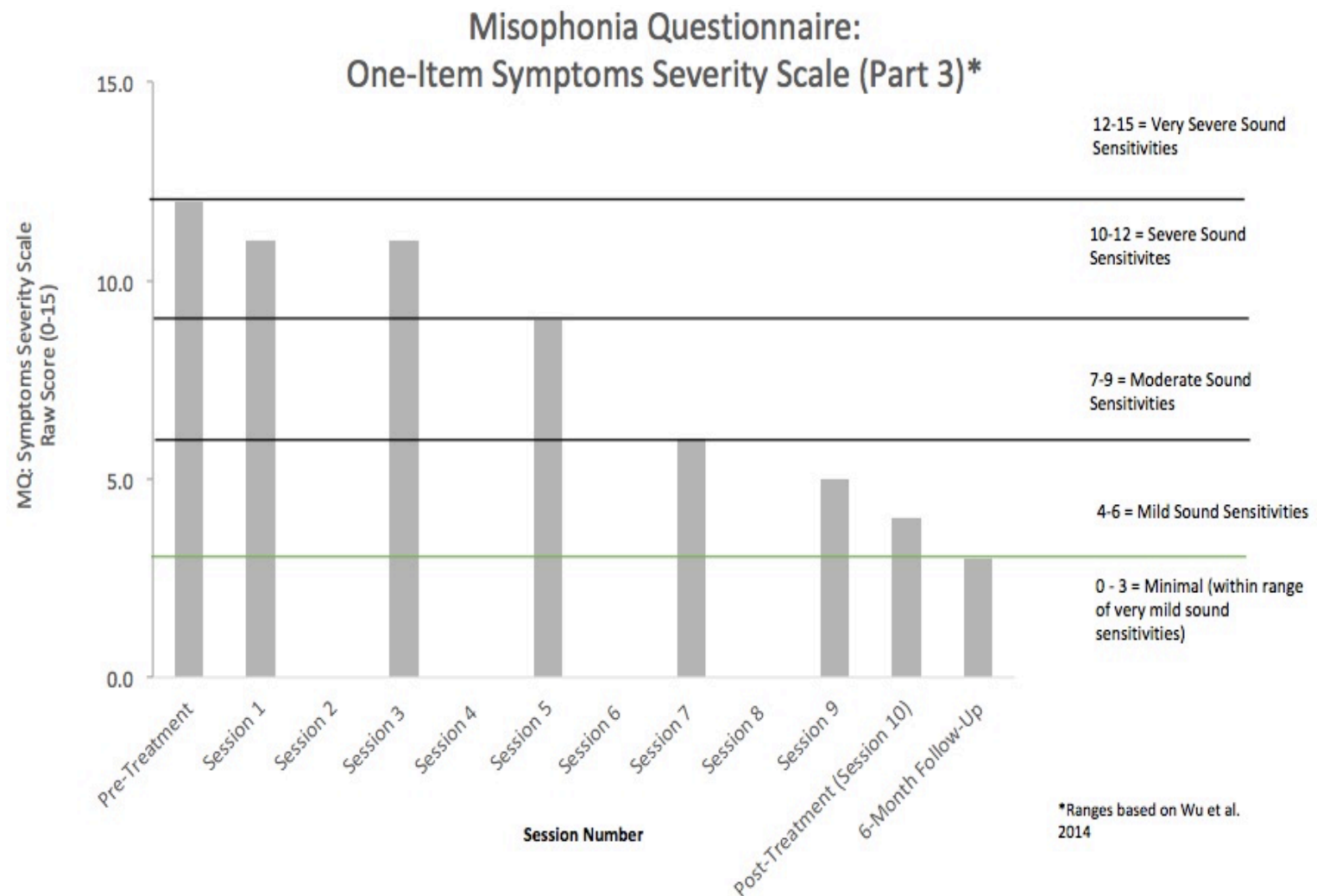
Pre-Post-Six Months: Amsterdam Misophonia Scale



CBT TREATMENT OF MISOPHONIA CASE

Figure 4

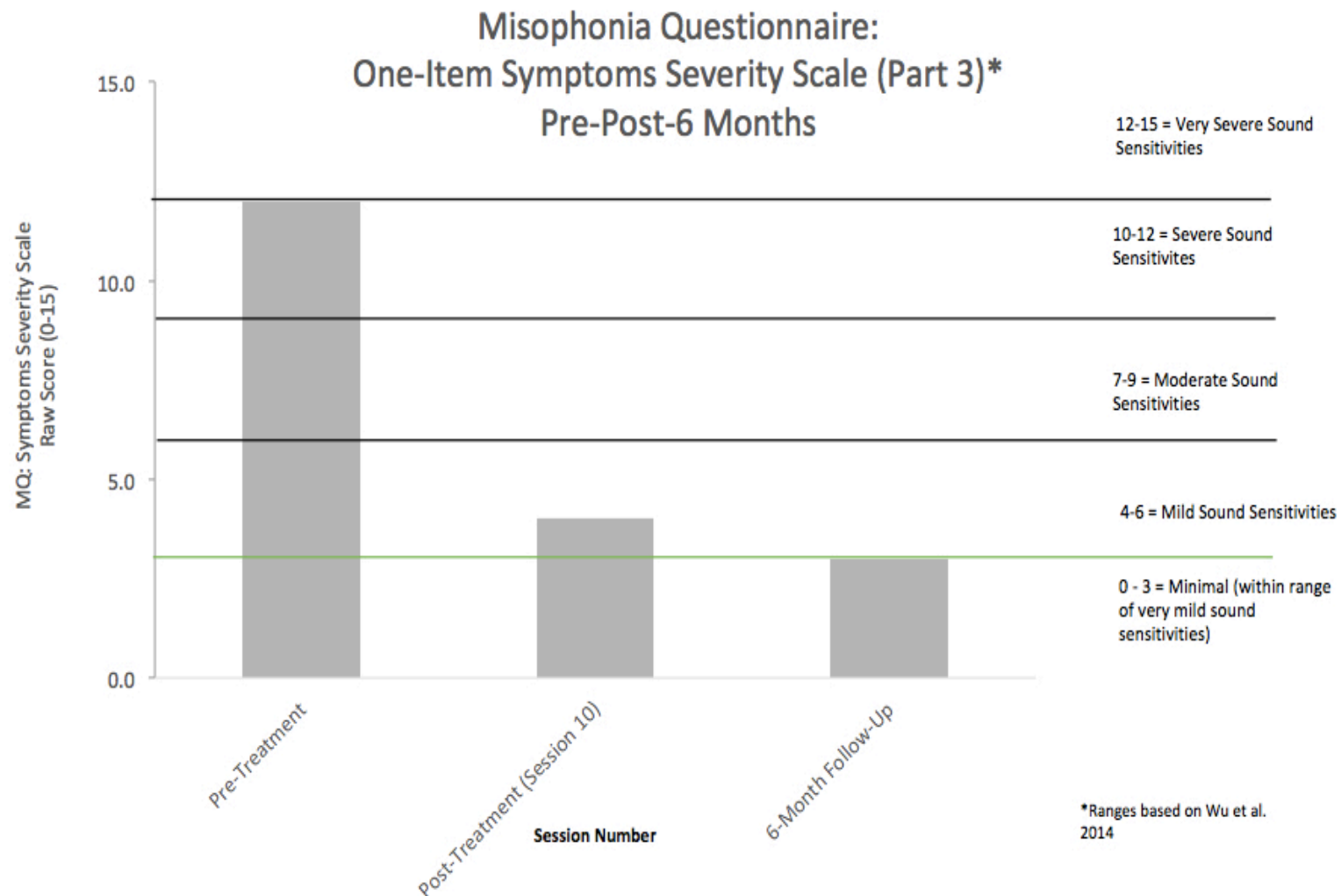
Session-to-Session Misophonia Questionnaire Part 3: One-Item Severity of Sound Sensitivity Scale



CBT TREATMENT OF MISOPHONIA CASE

Figure 5

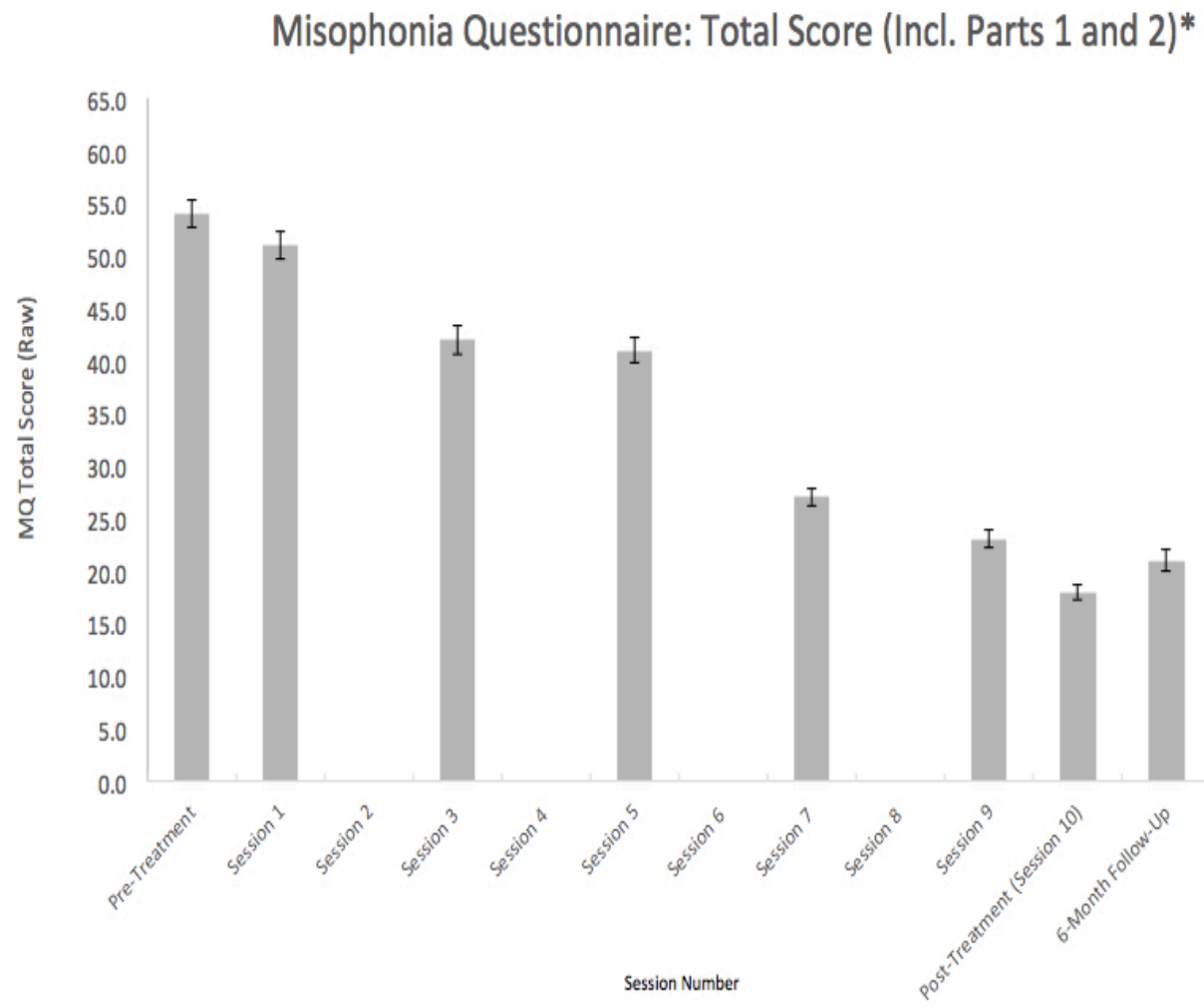
Pre-Post-Six Months Misophonia Questionnaire Part 3: One-Item Severity of Sound Sensitivity



CBT TREATMENT OF MISOPHONIA CASE

Figure 6

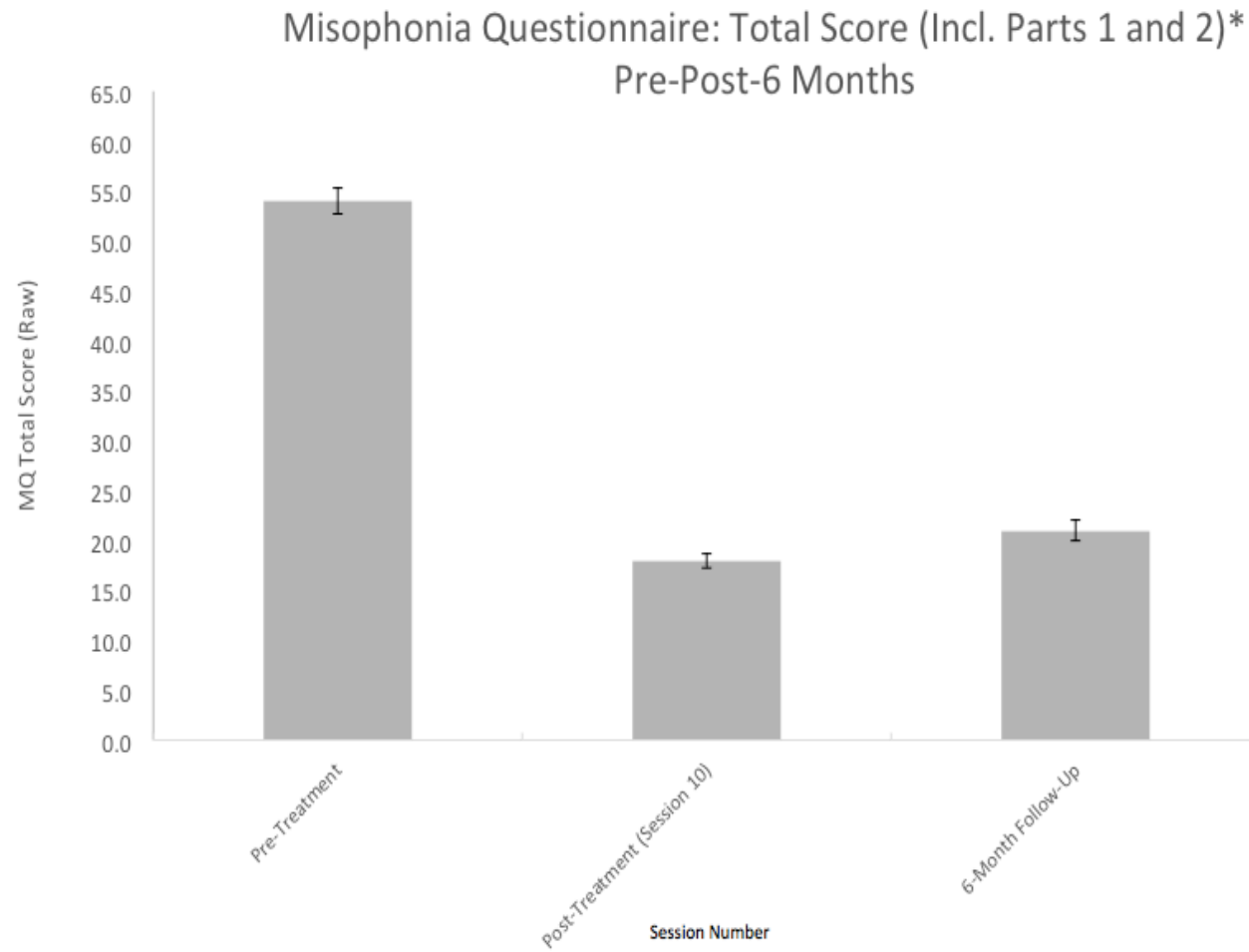
Session-to-Session Misophonia Questionnaire Total Score (Parts 1 and 2)



CBT TREATMENT OF MISOPHONIA CASE

Figure 7

Pre-Post-6 Months Misophonia Questionnaire Total Score (Parts 1 and 2)



APPENDIX

Appendix A. Instruments

1. Amsterdam Misophonia Scale (A-MISO-S) (Schröder, Vulink, & Denys, 2013) with permission from Dr. Schröder



Amsterdam Misophonia Scale (A-MISO-S)*

Name: _____ Date: _____

Rate the characteristics of each item during the prior week (7 days) up until and including the time you fill out this survey. Scores should reflect your average over the week. When it says *trigger*, it means any misophonia experience - sound, sight, touch, smell, etc.

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

None	<input type="radio"/>	0
Mild , less than 1 hr/day, or occasionally (thoughts about) triggers (no more than 5 times a day)	<input type="radio"/>	1
Moderate , 1 to 3 hrs/day, or frequent (thoughts about) triggers (no more than 8 times a day, most of the hours are unaffected).	<input type="radio"/>	2
Severe , greater than 3 hrs and up to 8 hrs/day or very frequent (thoughts about) triggers.	<input type="radio"/>	3
Extreme , greater than 8 hrs/day or near constant (thoughts about) triggers.	<input type="radio"/>	4

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

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

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

None	<input type="radio"/>	0
Mild , occasional irritation/distress.	<input type="radio"/>	1
Moderate , disturbing irritation/anger/disgust, but still manageable.	<input type="radio"/>	2
Severe , very disturbing irritation/anger/disgust.	<input type="radio"/>	3
Extreme , near constant and disturbing anger/disgust.	<input type="radio"/>	4

Amsterdam Misophonia Scale (A-MISO-S) from Schröder, A., Vulink, N., & Denys, S. (2013). Misophonia: Diagnostic criteria for a new psychiatric disorder. *PLoS ONE*, 8(1), e54706. doi:10.1371/journal.pone.0054706

Note: This form has been modified by replacing "sounds" with "triggers" to include all triggers.



Amsterdam Misophonia Scale (page 2)

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

Makes an effort to always resist , or symptoms so minimal, doesn't need to actively resist.	<input type="radio"/>	0
Tries to resist most of the time.	<input type="radio"/>	1
Makes some effort to resist.	<input type="radio"/>	2
Yields to all (thoughts about) misophonic triggers without attempting to control them, but does so with some reluctance.	<input type="radio"/>	3
Completely and willingly yields to all obsessions.	<input type="radio"/>	4

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

Complete control.	<input type="radio"/>	0
Much control , usually able to stop or divert thoughts about misophonic triggers.	<input type="radio"/>	1
Moderate control , sometimes able to stop or divert thoughts about misophonic triggers.	<input type="radio"/>	2
Little control , rarely successful in stopping or dismissing thoughts about misophonic triggers, can only divert attention with difficulty.	<input type="radio"/>	3
No control , experience thoughts as completely involuntary, rarely able to alter thinking about misophonic triggers.	<input type="radio"/>	4

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

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

CBT TREATMENT OF MISOPHONIA CASE

2. Misophonia Questionnaire (Wu et al., 2017)

Part 1. Misophonia Symptoms Scale

Directions: Please rate how much the following statements describe you on a scale from 0 to 4, 0 being "Not at all true" and 4 being "Always true."

0-----1-----2-----3-----4
Not at all True Rarely True Sometimes True Often True Always True

In comparison to other people, I am sensitive to the sound of:

- _____ 1. People eating (e.g. chewing, swallowing, lips smacking, slurping, etc.).
- _____ 2. Repetitive tapping (e.g. pen on table, foot on floor, etc.).
- _____ 3. Rustling (e.g. plastic, paper, etc.).
- _____ 4. People making nasal sounds (e.g. inhale, exhale, sniffing, etc.).
- _____ 5. People making throat sounds (e.g. throat-clearing, coughing, etc.).
- _____ 6. Certain consonants and/or vowels (e.g. "k" sounds, etc.).
- _____ 7. Environmental sounds (e.g. clock ticking, refrigerator humming, etc.).

Part 2. Misophonia Coping Emotions and Behaviors Scale

Directions: If any of the aforementioned statements were given a value of "1 – Rarely True" or higher, please continue onto the following section and rate how often the subsequent statements occur, 0 being "Never" and 4 being "Always."

0-----1-----2-----3-----4
Never Rarely Sometimes Often Always

Once you are aware of the sound(s), because of the sound(s), how often do you:

- _____ 1. Leave the environment to a place where the sound(s) cannot be heard anymore?
- _____ 2. Actively avoid certain situations, places, things, and/or people in anticipation of the sound(s)?
- _____ 3. Cover your ears?
- _____ 4. Become anxious or distressed?
- _____ 5. Become sad or depressed?
- _____ 6. Become annoyed?
- _____ 7. Have violent thoughts?
- _____ 8. Become angry?
- _____ 9. Become physically aggressive?
- _____ 10. Become verbally aggressive?

CBT TREATMENT OF MISOPHONIA CASE

Part 3. Misophonia Severity of Sound Sensitivity Scale

Directions: Please circle the severity of your sound sensitivity on the following scale from 1 (minimal) to 15 (very severe). Please consider the number of sounds that you are sensitive to, the degree of distress, and the impairment in your life due to your sound sensitivities.

If you do not have any sound sensitivities, please check here. _____

- 1 **Minimal within range of normal or very mild sound sensitivities.** I spend
- 2 little time resisting or being affected by my sound sensitivities. Almost no or no interference
- 3 in daily activity.

- 4 **Mild sound sensitivities.** Mild sound sensitivities that are noticeable
- 5 to me and to an observer, cause mild interference in my life and which I may
- 6 resist or be affected for a minimal period of time. Easily tolerated by others.

- 7 **Moderate sound sensitivities.** Sounds sensitivities that cause significant
- 8 interference in my life and which I spend a great deal of conscious energy
- 9 resisting or being affected by. Require some help from others to function in daily activity.

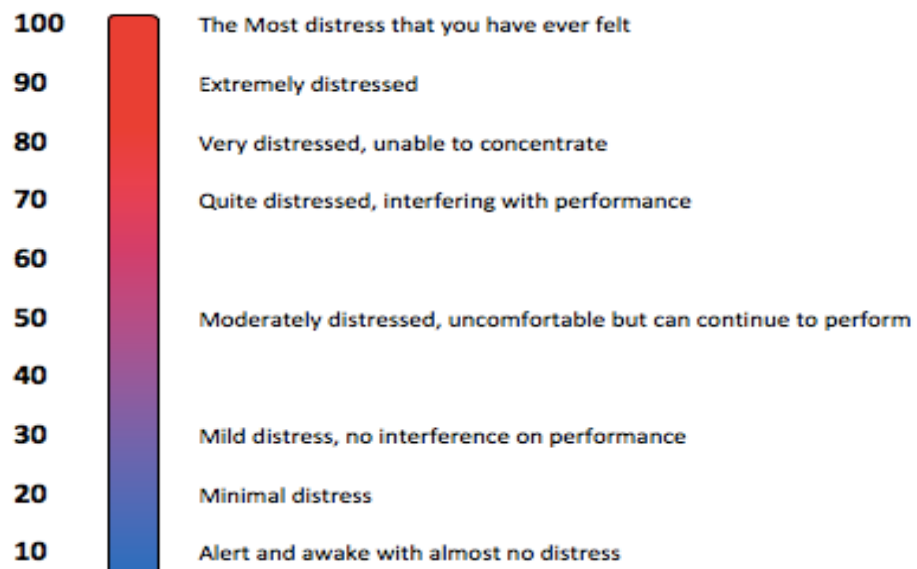
- 10 **Severe sound sensitivities.** Sound sensitivities that are crippling to me, interfering so
- 11 that daily activity is "an active struggle." I may spend full time resisting my sound
- 12 sensitivities or being affected by them. Require much help from others to function.

- 13 **Very severe sound sensitivities.** Sound sensitivities that completely
- 14 cripple me so that I require close supervision over eating,
- 15 sleeping, and so forth. It is hard to function on a day-to-day basis because of this.

Appendix B. Subjective Units of Distress Thermometer

1. SUDS: The Distress Thermometer

SUDS: The Distress Thermometer



Appendix C. Homework Forms

1. CBT Thought Monitoring Worksheet

Situation	Perpetrator/Trigger	Thought	Physiological reaction	Emotion	Behavior	Outcome

Appendix D. Sample Exposure Stimulus

1. Picture of Exposure Stimuli

