



# MISOPHONIA: SYMPTOMS, COMORBIDITIES AND PERSPECTIVES OF INTERVENTION. FROM THEORY APPROACH TO INTEGRATED CLINICAL PRACTICE RESEARCH

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## Abstract

*Recent scientific studies have noted that misophonia is a complex neurophysiological and behavioural syndrome characterised by high physiological and emotional reactivity, resulting from an intolerance to specific auditory stimuli. People with this distress have emotional and behavioural responses, excessive in relation to the auditory stimulus that provokes them; in fact, these people may have outbursts of anger, severe anxiety crises, and even panic attacks. One of the questions that the first studies of this syndrome have asked was what link occurred between misophonia and certain psychological disorders such as anxiety, depression, and personality disorders. Another important research objective was to examine the differential diagnosis between misophonia and hearing disorders such as tinnitus. In view of the current literature on misophonia, it has become important to define the comorbidity and differential diagnosis of misophonia with other disorders. The next step is, through further research on clinical cases, to define the most effective psychotherapeutic techniques on misophonic symptoms, and the psychoeducational tools needed to intervene in family systems with misophonic patients.*

**Keywords:** *comorbidity, differential diagnosis, psychological disorders, hearing disorders, misophonia, behavioural response, emotional response, psychoeducational tools, psychotherapeutic techniques*

## Introduction

Misophonia is a lesser-known clinical syndrome, with little to no scientific literature not always methodically reliable. Misophonia was originally described by Jastreboff (Jastreboff & Jastreboff, 2001, 2014); yet although syndromic features are beginning to be described empirically, misophonia has not been scientifically recognised as a mental illness (Sullivan et al., 2018).

The etymology behind the term ‘misophonia’ consists of the Greek words ‘misos’ and ‘phos’, i.e., hate and noise. Consequently, its features are a reluctance towards certain human-made noises and mechanical noises. Misophonia is a condition recognised by the newsfeed of the New York Times (Cohen, 2011) and the Today Show (Carroll, 2011) as characterised by mental illness of irritation, anger or disgust when presented ‘trigger’ sounds, that vary between people and environmental contexts.

Excessive reactivity to noises is found in many neurological, auditory, medical and psychiatric disorders such as tinnitus, hyperacusis (Jastreboff & Jastreboff, 2001), migraine (Sullivan et al., 2013), autism spectrum disorder (Ben-Sasson et al., 2009a; Danesh & Kaf, 2012; Lane et al., 2012), post-traumatic stress disorder (Attias et al., 1996; Finsterwald & Alberini, 2014), borderline personality disorder (Rosenthal et al., 2016), bipolar disorder and schizophrenia (Cabranes et al., 2013). The extent of the connection between the aforementioned disorder and the misophonic syndrome is not well defined yet.

CIPPS (Centro Internazionale di Psicologia e Psicoterapia Strategica, Salerno, Italy) with the scientific collaboration of Duke University (North Carolina, U.S.A.) aims to advance the knowledge of the symptomatology of this syndrome; to identify the therapeutic tools that can be used to tackle the symptoms; to understand whether misophonia is comorbid with psychological pathologies such as anxiety, depression, personality disorders and, in differential diagnosis, with organic pathologies, such as tinnitus, phonophobia and other hearing problems; to identify the resources and strategies that misophonic patients implement; to identify which neuroscientific and strategic psychotherapy techniques (CIPPS) are effective in treating misophonic symptoms, to compare them with cognitive-behavioural techniques (Duke University) and to hypothesise an integration between the two therapeutic orientations.

The joint work between CIPPS and Duke University aims to collect data on the most frequent symptoms, and whether any new ones emerge from the existing literature; for example, if new noises are identified that trigger disproportionate reactions; if misophonia comes before a disorder, such as anxiety, or manifests itself afterwards; which strategies are used by the patients; which psychotherapeutic techniques, based on the analysis of the interviews with patients, are more effective on misophonic symptoms.

After an initial survey of the data, an important result would seem to emerge, one already presents in the known literature (Tyler et al., 2014): the intensity of the annoyance to a sound seems to be linked to the degree of the relationship that the misophonic patient has with the persons from whom the trigger sound comes; it would seem that the person making the annoying sound is usually a significant individual within the family system. Consequently, a comprehensive intervention could be aimed at the entire family system with both psychotherapeutic and psychoeducational tools.

In the following, we will present the current state of knowledge on misophonia, the characteristics of a methodology that has just been launched by the International Centre of Psychology and Strategic Psychotherapy (CIPPS) and the first data that have emerged, on the basis of which we can hypothesise how to improve the same methodology, hypothesise techniques and intervention strategies in the psychotherapeutic and psychoeducational spheres.

## Misophonia: Trigger Sounds, Emotional and Behavioural Responses

Misophonia is characterised by extreme sensitivity to specific human-generated sounds (Schroder et al., 2013). In the 1990s, audiologist Johnson spoke of ‘selective sound sensitivity syndrome’, then Jastreboff and Jastreboff used the word misophonia. It all started with Pawel Jastreboff’s model of tinnitus (Jastreboff, 1990). Based on this, Pawel and Margaret Jastreboff developed Tinnitus Retraining Therapy (TRT), which includes recurrent exposure to a low-level broadband sound in an attempt to facilitate habituation by interfering with the neural regions responsible for tinnitus generation (Jastreboff et al., 1996). Using TRT during a study with patients suffering from hyperacusis, Jastreboff coined the term misophonia.

During this study, Jastreboff and Jastreboff noticed that patients with hyperacusis responded with annoyance to sounds that have fixed patterns, such as the clicking of a pen, chewing or the dropping of a drop of water, regardless of the decibel level (Jastreboff & Jastreboff, 2001).

Jastreboff and Hazell in 2014 pointed out that the most common reaction to trigger sounds is anger, but can also include anxiety, frustration, disgust, and thoughts of wanting to hurt the person who produces the annoying sound (Jastreboff & Hazell, 2014).

Subjects suffering from misophonia seem to have difficulty in continuing to manage their lifestyle, as the symptoms affect the relational environment up to and including the workplaces. Schwartz noted during his study that misophonic subjects often alienate those close to them, resulting in the loss of relationships, employment, and even social isolation (Schwartz et al., 2011).

In a study of sound evocation, Kumar et al. (2017) highlights the main 'trigger' sounds that trigger patients' reactions of disgust, anger, anxiety, and helplessness. Specifically: loud chewing, coughing, sniffing, nibbling, deep breathing, clattering of cutlery, swallowing, loud drinking, ticking, knuckle cracking, clinking, nail biting. In addition to this classification, one can also associate with 'trigger' sounds those noises produced by computer fans, refrigerators, air conditioners, i.e., all those noises that present characteristics of continuity and repetitiveness, as is emerging from the first data CIPPS collected at the listening desk for misophonic patients.

It is suggested (Jastreboff & Jastreboff, 2014; Wu et al., 2014) that misophonic individuals present annoyance to visual stimuli associated with repetitive movements, such as hair twirling, and with auditory triggers, i.e., jaw movement related to chewing, or movements that precede an auditory trigger. Triggers are initially located in a small number of sounds or behaviours produced by a small number of people in the misophonic subject's life (Schroder et al., 2013). As a person with misophonic symptoms increases avoidance from triggers, the number and type of triggers for the aversive reaction increases, until these triggers and attempts to avoid them become harmful (Edelstein et al., 2013). We might add that the trigger sounds, which generate an annoyance response in misophonic subjects, are produced by a close person (Jager et al., 2020; Taylor, 2017; Wu et al., 2014) and this increases anger and anticipatory anxiety in misophonic subjects for not being able to cope with this difficulty and results in social withdrawal. It should also be kept in mind that the response to 'trigger' sounds may depend on many factors besides the person producing them, such as: personal experience, social context, or the psychological profile of the individual (Schewemmie & Arens, 2021).

## **Aetiological Hypotheses of Misophonia**

According to the scientific literature, there is no clear specification behind the causes for the annoyance related to trigger sounds, but there is one analysis of the brain activations associated with them. The aetiology and nature of misophonia has been attributed to physiological anomalies in the brain (Møller, 2011), hyperresponsiveness similar to sensory processing disorder (Schröder et al., 2013) and classical conditioning (Dozier, 2015b; Jastreboff & Jastreboff, 2014; Schröder et al., 2013). In fact, Kumar, while investigating the neurobiology in relation to misophonia, described how in misophonic patients there is an increased activation of the insular cortex in the anterior portion which seems to be related to associative learning processes and memory (Kumar et al., 2017). And again, Kumar et al., hypothesised the involvement of the mirror neuron system in misophonia as most activation sounds arise from orofacial movements. Schorder et al. studying misophonic subjects exposed to trigger sounds, using an audiovisual technique, found functional activation of the right insula, right anterior cingulate cortex, and temporal cortex (Schorder et al in 2019).

Palumbo et al. suggested that, however, within learning, classical conditioning, non-associative learning and sensitisation there may be significant helpful indices that can explain the mechanisms underlying misophonia, linking also to Jastreboff's hypothesis in 2001 that misophonic responses are developed and maintained through associative learning processes in particular contexts, concluding that these responses are based on neural circuits responsible for emotion, memory and learning (Palumbo et al., 2018, Jastreboff et al., 2001).

Moreover, as Kumar observed in 2017, that in the brains of patients with misophonia there was hyperactivity of the anterior insular cortex and abnormal functional connectivity with the medial frontal, medial parietal, and temporal regions (Kumar et al.2017).

Misophonia is not yet described within any of the diagnostic manuals such as the DSM-5 and ICD-11. Although there is a study conducted by the Amsterdam University Medical Centers

in 2013, which proposed the first diagnostic criteria for misophonia as a clinical disorder, there is still no unified view within the scientific groups that can define misophonia as a condition in its own right (Schorder et al., 2013).

Based on clinical diagnoses we know that excessive reactivity to trigger sounds is a feature found in several disorders of neurological, auditory, medical and psychiatric disorders such as tinnitus, hyperacusis (Jastreboff & Jastreboff, 2001), migraine (Sullivan et al., 2013), autism spectrum disorder (Ben-Sasson et al., 2009a; Danesh & Kaf, 2012; Lane et al., 2012), post-traumatic stress disorder (Attias et al., 1996; Finsterwald & Alberini, 2014), borderline personality disorder (Rosenthal et al., 2016), bipolar disorder and schizophrenia (Cabranes et al., 2013), but despite this, research has felt the need to investigate comorbidities and differences between misophonia and the various personality disorders and other clinical conditions classified in diagnostic manuals.

McKay et al. in 2018, in a study of 628 participants who associated misophonia with obsessive-compulsive symptoms, highlighted that in misophonic subjects there was a higher prevalence of levels of order and harm avoidance than obsessional traits (McKey et al., 2018). Schorder et al. through a recruitment of 42 adult subjects, in a mental health centre, who self-reported misophonic symptoms, assessed that most of these subjects fulfilled the criteria for obsessive-compulsive personality disorder, while others for ADHD, anxiety disorder and obsessive-compulsive disorder, concluding that misophonia can also be defined as a sub-disorder of the broader classification of obsessive-compulsive disorder categorised in DSM-5. Rouw et al. in 2018 found that post-traumatic stress disorder was prevalent in people with misophonia, where misophonic symptoms presented in a more severe condition (Rouw et al., 2018). An additional highly correlated disorder, noted through studies conducted by Erfaniano et al. in 2018, is depression; the greater the severity of misophonic symptoms, the higher the percentage of major depressive conditions. From what has been reported, it emerges that despite the multiple studies conducted, the correlation between misophonia and personality disorders cannot be given as a certainty, as the number of samples subjected to assessment is not random and free of interference, stemming from evaluations carried out through self-report interviews (Bellavista et al., 2022); this is why research on the topic is yet again necessary.

## Hearing Disorders, Misophonia and Differential Diagnosis

As we move on to the differential diagnosis, we could deduce that there are conditions that exclude misophonia from the characteristic symptoms of tinnitus, hyperacusis and synesthesia (Taylor, 2017; Robinson et al., 2018). Hyperacusis is a medical condition in which the subject has a strong annoyance at a sound perceived to be very loud. The presence of such a sound induces in subjects with hyperacusis, pain, fear and annoyance, experiencing them separately or all together. What differentiates hyperacusis from misophonia is the characteristic of the sound, in that, in misophonia, the reaction to sound is not related to the decibels of the sound itself, whereas in subjects with hyperacusis, the reaction is linked to volume and frequency. Furthermore, another distinction is that misophonic triggers are not the same for all people, e.g., not all misophonic individuals are bothered by the chewing trigger; furthermore, the same trigger can provoke angry reactions or anxious states at home, but not at work (Robinson et al., 2018; Taylor, 2017).

Tinnitus is a complex neurological condition; sufferers experience ringing in one or both ears, sometimes even hearing loss occurs. According to Jastreboff, tinnitus arises due to abnormal neural activity in the auditory pathways, which is perceived by the neocortex as a ringing noise (Jastreboff & Jastreboff, 2014). Tinnitus refers to the perception of sounds in the absence of external acoustic stimulation, whereas in misophonia the trigger response is generated by a sound emitted by a nearby person and/or objects.

Synesthesia is a condition in which one sensory stimulus or sensation evokes another sensation that is apparently neither related nor associated (Edelstein et al., 2013). What differentiates the two clinical conditions is that in synaesthesia there is a set of inducer-to-concurrent associations, a feature not defined in misophonia, as the stimulus from which the trigger originates is not established and unambiguous but varies from subject to subject; furthermore, synaesthetic responses remain constant, an undetermined aspect in misophonic patients (Edelstein et al., 2013). The likelihood that

misophonic responses may change over time is confirmed by a study conducted by Edelstein et al. in 2014. That study collected significant data from participants reporting that symptoms worsened over time (Edelstein et al., 2013; Kluckow et al., 2014; Bernstein et al., 2013), presumably caused by the negative reinforcement to the trigger responses (Jastreboff & Jastreboff, 2014).

In conclusion, it would seem important to dwell on two aspects: it is unclear, to this day, as we need to keep moving in the field of research, how much misophonia can be considered as a disorder in its own right or as a sub-disorder related to other disorders and/or clinical pathologies; and what the triggers of misophonic symptoms are, their age of onset and the course they take over time.

### **The Methodology of the International Centre of Psychology and Strategic Psychotherapy: Listening Desk, Interviews, Checklists**

On 27 March 2021, an important collaboration between the CIPPS (International Centre of Psychology and Strategic Psychotherapy) and the AIMIF (Associazione Italiana Misofonia, or Italian Misophonia Association) began via a listening desk dedicated to misophonic patients. The service, which can be accessed from all over Italy, aimed to welcome and support misophonic patients from a psychological point of view, and to carry out research into this little-known clinical syndrome. The listening desk can be accessed by those affiliated with the AIMIF; people who become aware of the listening desk can contact the helpline and are told, if they are not already members of the Association, how to proceed with affiliation, as affiliates benefit from three free meetings with the therapist. A therapist contacts the user to acquire an e-mail to which should be sent the consent for personal data processing, the Duke Misophonia Questionnaire, abbreviated DMQ (Rosenthal et al., 2021) and the Duke Misophonia Interview checklist, abbreviated DMI. These documents must be completed and sent to the therapist before the first interview begins.

Said checklist, known as the Duke Misophonia Trigger, an addendum to the Duke Misophonia Interview (Rosenthal et al., 2021), is used to preliminarily identify misophonic triggers as reported by interviewees.

This addendum facilitates the administration of the DMI, helping to determine the presence or absence of triggers and inviting subjects to select the most disturbing noises before starting the clinical interview.

It is important for the therapist to acquire this information prior to the first interview, in which an intervention aimed at improving the person's problem already takes place. The strategic approach, on which the CIPPS team is based, originates as a brief therapy and within the first interview an immediate intervention is made on the patient's symptoms (Nardone & Watzlawick, 2010). At the moment the interviews take place on-line as the CIPPS team operates in Salerno (in Southern Italy) and the first patients called from regions in Northern Italy.

### **The First Three Interviews**

During the first two interviews, the therapist, in addition to establishing a clinical relationship with the patients, explaining how the service works and that they could continue, depending on the discomfort encountered, with a psychological support or psychotherapy treatment, examines together with the patient the answers given to the questionnaire, integrating them, and exploring them in depth with the DMI.

During these three interviews, the therapist's objective is to acknowledge the patient's request for help, to have an overview of what the person's misophonic symptoms are, what personal solutions they have implemented, consequently which ones have worked, and which ones have failed, and to know to what extent the misophonic symptoms create psychological discomfort and whether this discomfort influences and/or compromises the person's social, work, and affective functioning.

The therapist aims to find out whether the misophonic symptoms have created other difficulties on a psychological level, whether they have therefore caused, for example, anxiety, or whether the person was suffering from an anxious state that has been succeeded by misophonia; whether or not tinnitus, hearing loss, hyperacusis/hypersensitivity to sounds, selective sound sensitivity syndrome (Taylor, 2017; Robinson et al., 2018) have been detected.

At the end of the third interview, the clinician provides the patient with feedback on what emerged from the first three interviews and, based on the level of distress detected through the answers given to the questionnaire, the interview, and the subjective assessment by the therapist, proposes an extended psychotherapy or psychological support program.

Patients who continue the treatment will retake the Duke Misophonia Questionnaire at the last meeting, in order to compare the answers given on the first DMQ compiled before the start of the three interviews with those given at the end of the whole treatment.

After the three interviews, the therapist compiles a checklist that was constructed by the CIPPS team and presented at the Duke University meetings. The checklist is updated if the patient continues with psychological support or psychotherapy. The team behind the listening desk consists of six therapists coordinated by a supervisor. It may be important for the team to make use of other professional figures such as an audiologist and an ENT specialist, for a diagnostic framework that also takes into account the more organic aspects related to hearing. If the team deems it necessary, it can also request a consultation with a psychiatrist from the CIPPS Clinical Centre for patients at the counter.

### **DMQ (Duke Misophonia Questionnaire) and DMI (Duke Misophonia Interview)**

The CIPPS team employed the first version of two tools, the Duke Misophonia Questionnaire (Rosenthal et al., 2021) and the semi-structured interview (Duke Misophonia Interview) abbreviated respectively DMI and DMQ, to perform an adequate analysis of the misophonic patients' help request. These tools facilitated the therapist in structuring the first two interviews.

The psychometrically validated DMQ questionnaire consists of 86 items, divided into the following subscales: trigger frequency, investigated by 16 items; affective responses to triggers, investigated in 5 items; physiological responses, 8 items; cognitive responses, 10 items; coping before (6 items), coping during (10 items) and coping at the end of the trigger event (5 items); the harm and invalidation caused by the misophonic event (12 items), and beliefs related to the pathology (14 items). In addition, there are consequential composite scales for overall symptom severity (assessing affectivity, physiology, and cognition in combination) and for coping strategies. The choice to use the DMQ proved to be significant as, unlike other similar instruments such as the Misophonia Questionnaire (Wu et al., 2014), the Amsterdam Misophonia Scale (Naylor et al., 2021), and the Misophonia Response (Dibb et al. 2021), it does not focus on the symptoms and disabling facets of the syndrome, but rather on the patients' processes; as a matter of fact, the Duke Misophonia Questionnaire originated from the need to have an instrument that would take into account, in a clinical and research context, and in a comprehensive manner, the affective, cognitive, behavioural and physiological processes that arise in response to misophonic symptoms (Rosenthal et al., 2021). Thus, by administering this questionnaire, it is possible to arrive at the development of targeted interventions that take into account the differences in reactivity and responsiveness of patients to misophonic triggers. For example, patients who report distressing experiences as a symptom would benefit from a different therapeutic intervention than those who report primary problems of hypervigilance, excessive avoidance, or other. In other words, the intervention must be accordingly tailored to the patient.

The DMQ scales have been psychometrically validated to investigate a wide range of responses and coping strategies to misophonic stimuli before, during and after exposure to the respective triggers, as well as affective, physiological, behavioural, and cognitive response scales to these triggers. The frequency over the past month of exposure and type of response to the same stimuli is also measured (Rosenthal et al., 2021).

The DMI is a semi-structured clinical interview consisting of 25 items and used to assess the misophonia-related experiences that individual experiences on a daily basis and, more specifically, that they have experienced in the month prior to administration. The structure of the DMI is based on other interview instruments used in clinical and research settings, including the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5) and the Anxiety Disorders Interview Schedule for DSM-5 (ADIS-5). The importance of this interview stems from the fact that there are currently no

other psychometrically validated interviews for misophonia capable of gathering information about the clinical syndrome, and the results of the DMI provide preliminary support in clinical procedures (Guetta et al., 2022). The semi-structured interview is developed from the above-mentioned addendum, through which the patients identify their three most annoying sound triggers, which should be noted prior to the administration of the questionnaire. Subsequently, the patients will be asked to rate on a scale from 1 (lowest) to 10 (highest) the level of the intensity of distress they have experienced, in the last month, due to the symptoms. This measure is called the Subjective Unit of Distress Scale (SUDS) and is necessary because it provides a subjective specificity to the salience of the events experienced that can be referred to during the later stages of the interview, so as to improve the reliability and validity of the answers.

Each interview item is then reformulated and addressed to the patients, using their own language, in order to reflect their chosen definitions (e.g., if the patients reported the noise of chewing as the main trigger, the questions would not be asked in terms of “trigger” but rather “the noise of chewing” would be used). Each item of the interview surveys first of all the presence or absence of the symptom in question, in terms of frequency and distress; after the subject has answered the questions that make up an item, the clinician assigns the whole item a score ranging from zero to four (from absent to very severe).

Frequency is defined as the number of times the symptom occurred during the last month, a frequency that the patient can express as a percentage of time or by expressing the number of times the symptom was relevant during a day in terms of waking hours. The detection of distress is done by means of the SUDS “Subjective Unit of Distress Scale” (structured within the interview) of the individual and by the description of the intensity of the symptom, on average, during the last month. Based on the answers on frequency and distress, the clinician designates the severity score of each item on a Likert scale. The frequency and discomfort scores are not always directly related to each other: there may be cases in which a symptom presents itself daily, incessantly, at every hour of the day, but has a very low intensity of distress and is defined as barely relevant by the patient, just as a single episode over a thirty-days period may have an intensity that causes severe impairment. In cases of inconsistency, the interview guidelines advise the clinician to cautiously focus on the low intensity or the lowest frequency.

Several items also include an assessment of overall impairment, also measured by a Likert scale, in areas related to sensory, behavioural, emotional, interpersonal, and physiological domains, as well as an overall assessment of symptom severity.

In order to collect and highlight the data functional to achieving some of the set objectives, i.e., greater knowledge of misophonic symptomatology, comorbidity with other psychological problems and with other hearing disorders, useful resources used by the patients, the team at CIPPS constructed a checklist for each patient in order to collect the data that emerged during the interviews.

### **The Checklist: Data Collection, First Interventions and Results**

The questions from the Duke Misophonia Questionnaire and the content analysis of the first patient interviews at the listening desk were used to construct the CIPPS’ checklist. The checklist, which serves to collect data on the targets set by CIPPS and Duke University, was divided into the following items:

- Comorbidity with other psychological disorders, specifically anxiety disorder, mood disorders, sleep disorders, obsessive-compulsive disorder (OCD), attention deficit disorder and/or Hyperactivity Disorder (ADHD), cognitive deficits;
- Reactions associated with listening to trigger sounds such as anger, anticipatory anxiety, isolation, brooding;
- Trigger sounds: chewing noise, snoring, ticking, nasal noises, breathing, paper noise, car noise, particular speech sounds.
- Strategies used by the patient to cope with misophonic symptoms;
- Significant symptom-related relationships, i.e., relationships within which the patient is most activated by trigger sounds;

- Presence of other hearing disorders: tinnitus, hyperacusis, selective hypersensitivity and hypersensitivity to sounds.

Seven patients are currently attending the listening desk. Five of them came through information received from the AIMIF, one through research carried out using search engines and the last through contact information provided by acquaintances.

The checklist was compiled for each patient after the first three interviews provided by the listening desk, and at the end of the psychological support or psychotherapy treatment, both to record and observe the frequency with which each item occurs in the cases studied, and to record any changes between the beginning, the first three interviews, and the end of the treatment course in the individual subject. The checklist was compiled taking into account the answers given to the DMQ, the DMI and the therapy itself.

In detail, the following emerges from the first three interviews:

The psychological disorders included in the checklist are those that, from the existing scientific literature, appear to have a higher comorbidity with misophonia (Robbins et al., 2021; Jager et al., 2020). Specifically, three out of seven patients report having previously been diagnosed with an anxiety disorder, two out of seven with a mood disorder, one with traits of obsessive-compulsive disorder with mild cognitive impairment and one with a diagnosis of dependent personality disorder.

The analysis of the DMQ responses on the reactions associated with listening to trigger sounds shows that

Two out of seven patients use isolation, i.e., limiting attendance at places and situations where there is a likelihood of hearing trigger sounds;

- Two out of seven patients record brooding, i.e., repetitive thinking triggered in an attempt to implement a problem-solving process about a potential danger represented by the likelihood of the occurrence of the trigger sound;
- Five out of seven patients state that they feel agitated and emotionally activated by the possibility of the occurrence of the trigger sound, showing anticipatory anxiety;
- Five out of seven patients state that they experience high levels of anger as a consequence of hearing the trigger sounds;
- Four out of seven patients experience a sense of helplessness, i.e., inability to react to the presence of the trigger sounds.

The data concerning trigger sounds were also extrapolated from the analysis of the Duke Misophonia Questionnaire, which has an area dedicated to the categorical gathering of information concerning sounds that the patient perceives as misophonic. Five out of seven patients consider nasal sounds, breathing and chewing sounds to be triggers; four consider the sound of snoring, three the sound of ticking and two out of seven patients the sound of hearing the pronunciation of the letter “s”. In addition, the sound of cars, computer fans, children’s footsteps, footballs, and loud music were reported by individual patients.

From the analysis of the clinical interviews, all patients report that reactions to trigger sounds are exclusively correlated and/or intensified when produced by significant others. It would therefore seem that the relational dynamics between the misophonic patient and the significant person of reference have a relevant impact on the activation of misophonic reactions, as also reported by some studies (Tyler et al., 2014).

In the checklist we find an item indicating the presence or absence of any hearing disorder, based on what the patients reported, since in the scientific literature several studies (Jastreboff & Jastreboff, 2001; Jastreboff & Jastreboff, 2014) were based on the hypothesis of finding correlations and/or making a differential diagnosis between the aforementioned disorders and misophonia. From our initial data, it would appear that only one in seven patients had, from previous audiometric investigations, been diagnosed with a hearing disorder, specifically tinnitus.

In the checklist there is also an item in which we report the strategies, described during the interviews, through which the patients used to cope with trigger sounds, differentiating, for each patient, those through which they experienced relief in the short term and those from which they never benefited. The most important ones were: using earplugs, listening to music and changing rooms. Specifically, the use of earplugs/earphones was tested by five patients, with a positive ef-



fect in four of them. Listening to music in conjunction with the presence of the trigger sound was tried out by six patients, with a positive effect in five of them. Changing rooms was tried out by six patients, having a positive effect in five of them.

At the end of the three interviews provided by the listening desk, the patient has the option of starting a psychological support or psychotherapy treatment; four of the patients decided to do so. Before the last session of the support treatment, the patients recompile the Duke Misophonia Questionnaire and their answers, together with the contents that emerged during the interviews, are used to fill in the items on the checklist. In this way, it is possible, within the checklist, to compare the patient's condition before the start of support or psychotherapy with the condition at the end of the treatment. It would appear from this comparison that the significant differences between before and after are above all inherent in the decrease in the intensity with which trigger-related reactions appear and in the perceived annoyance of hearing trigger sounds. What appears to be unchanged are the reactions to the emission of trigger sounds by persons significant to the patient. On the basis of what has been said, it should be pointed out that the correlation between misophonic reactions and the sound origin, although it emerges in our data, does not yet have statistical significance and scientific value and will therefore be the subject of further research by the CIPPS team

## Future Perspectives

The main future goal will be to expand and deepen knowledge on misophonia. CIPPS, in collaboration with the Duke Centre for Misophonia and Emotion Regulation (CMER) and the University of Salerno, plans to administer the Duke Misophonia Questionnaires to a significant sample of university students and trainees in TFA course (Teachers' Training internship Programmes, postgraduate specialisation to support disability students in schools).

The analysis of the questionnaire scores would first of all make it possible to spread awareness of the existence of misophonia, to identify people who might have misophonic symptoms and consequently to collect data on misophonic symptoms, frequency, strategies. The administration of such an instrument would represent an initial investigation from which to design interventions to raise awareness of a syndrome that is unknown especially by those who suffer from it not knowing they belong to the category of misophonic subjects.

Patients who come to the listening desk could be administered self-report tools to detect personality disorders, anxiety disorders, depressive disorders, so as to possibly detect comorbidity or differential diagnosis with other clinical pathologies, with the aim of deducing whether misophonia can be considered a consequence or a symptom of other diagnoses or a condition in its own right. Some of these tests to detect these psychological disorders could be the following: SCID-1, MMPI-2, SCL-90; CORE-OM. Assisted patients will be referred, if they have not already done so, for audiometric screening to exclude or diagnose other hearing disorders.

The ultimate aim behind the entire project is to find, through constant discussion with the Duke University team, techniques that will help the patient to manage trigger sounds in everyday life and thus mitigate the negative reactions associated with them.

Based on a cognitive-behavioural approach, Duke currently refers to two main protocols in the treatment of misophonia. Their choice of protocols and techniques to be implemented with the patient is made by taking into account the peculiarities of the patient. This starting point unites Duke's approach with the CIPPS' approach, in which the therapeutic intervention is strategically constructed on the individual patient, starting from their difficulties, and taking into account their strengths above all.

The first protocol Duke uses for misophonic patients is Process-based CBT (Hofmann & Hayes, 2019) which is based on a careful functional analysis where the patient is trained to notice and record what happens before, during and after hearing the trigger sound.

The analysis is done by investigating attentional, psychological, cognitive, relational, and behavioural reactions. On the basis of the data recorded by the patient, a decision is made to work towards the acquisition of cognitive, attentional or bodily techniques aimed at learning and tolerating the trigger sounds and managing the reactions associated with them.

Among the typical methods of the strategic approach that have features in common with

Process-based CBT are the logbook technique and the technique of problem deconstruction. In the use of the logbook, the therapist asks the patient to write in a notebook, recording the progress and developments of the problem under investigation, noting physiological, emotional, and behavioural reactions when they feel discomfort at a certain sound. The requirement to keep a diary can be extremely useful to the therapist in gathering information about how and how often the symptom occurs. Moreover, when the patient is asked “to meticulously note down situations, times, people present, places and other details related to the problem at the very moment it manifests itself, a shift of attention from the symptomatology to the task is achieved and this frequently results in greater awareness and, more importantly, a reduction in the intensity of the symptoms” (Secci, 2012, p. 69). The deconstruction technique “aims to identify the cognitive, emotional and behavioural structures through which the problem manifests itself and lasts. In order to deconstruct the problem, the therapist invites the patients to recount specific situations experienced with particular discomfort and helps them to break them down into chronologically ordered and interconnected units, so that they collectively represent a description of the sequence of events that generates and maintains the disorder. [...] Deconstruction leads to the discovery of recursive elements that precede, accompany, and follow the manifestation of the symptomatology. The patient’s emotions, thoughts and behaviour are inserted into the sequence of the problem by establishing a vicious circle, an endless game that would be invisible without the breakdown and punctuation of events that is achieved through this technique” (Secci, 2021, p. 68)

The CIPPS approach will also investigate the attempted solutions, i.e., the strategies that the subject is accustomed to employ in order to deal with the perceived sound as frustrating, unpleasant, negative. As emerges from the scientific literature (Schewemmie & Arens, 2021), one of the strategies most frequently implemented by the misophonic patient is the avoidance of the aforementioned situations, which would progressively lead to social isolation. By means of strategic dialogue (Nardone, 2004), the patient can be made aware of the ineffectiveness of the attempted avoidance solution, which, in fact, does not help them solve the problem, and thus lead them to work on sound desensitisation.

The second Duke Center protocol used with misophonic patients is the Unified Protocol for Transdiagnostic Treatment of Emotional Disorders (Barlow et al., 2017), which focuses more on the emotional reactions triggered by trigger sounds; this protocol is based on the observation that these reactions lead to a reduction in activities and situations in which there is a risk of hearing them, which is why it uses sound desensitisation techniques.

The progress of the psychological support interviews, the possible use of Duke’s techniques and those of CIPPS, will be constantly monitored to verify their effectiveness, not excluding the possibility of introducing, in the future, other instruments that prove to be suitable for the treatment of misophonic symptoms and outlining an integrated intervention protocol between Duke’s therapeutic approach and that of CIPPS.

## Conclusions

The data collected so far would seem to confirm what is reported in regards of the symptoms characterising misophonia, the emotional and behavioural reactions of the patients, the possible comorbidity with other disorders, both psychological, such as anxiety and depression, and organic, such as tinnitus. It will certainly be necessary to increase the number of patients to whom administer the DMQ and the DMI, as to collect statistically significant data in order to proceed with a more in-depth analysis that may include the use of other tools to investigate the presence of psychological disorders, thus enhancing the accuracy of our methodology. At the same time, the importance is also emerging of reinforcing the strategies that misophonic patients themselves put in place, following the teachings of Milton Erickson, whose hypnotherapeutic model focuses on identifying the patient’s strengths, reinforcing them, and conveying confidence so that they can identify new ones. The team’s intervention has been based on this therapeutic principle since the first interviews. It is believed, both from what is reported in the literature and what is emerging from findings, that reactions to misophonic symptoms depend very much on the person who gives them out. Therefore, it may be important to work not only on an individual level but also on the

system in which the misophonic subject lives, both with psychotherapeutic and psychoeducational interventions. As some studies report it becomes important, in order to reduce the emotional and behavioural reactions to misophonic sounds, to be able to make a psychoeducational intervention on the whole system: the misophonic patient is put in a position to talk about their difficulties with the family system, or rather with the person who emits the trigger sound and together, with the guidance of the therapist, to build ways of managing the problematic behaviour.

### Declaration of Interest

The authors declare no competing interest.

### Notes

This scientific article is the result of a joint work by the authors.

M. Zachary Rosenthal is the scientific supervisor.

Maria Annarumma is the author of the paragraph: Introduction.

Francesco Sessa is author of the paragraphs: The methodology of the International Centre of Psychology and Strategic Psychotherapy: listening desk, interviews, checklist; conclusions.

Iris Consalvo is the author of the paragraphs: Misophonia: trigger sounds, emotional and behavioural responses; Etiological hypotheses of misophonia; Hearing disorders, Misophonia and differential diagnosis

Valerio De Masi is author of the paragraphs: DMQ Duke Misophonia Questionnaire and DMI Duke Misophonia Interview

Luana Pagano is author of the paragraphs: The check-list: data collection, first interventions and results; Future perspectives.

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