Center for Open Access in Science ▪ https://www.centerprode.com/ojpr.html
Open Journal for Psychological Research, 2018, *2*(1), 1-12.
ISSN (Online) 2560-5372 ▪ https://doi.org/10.32591/coas.ojpr.0201.01001k

Psychological Sensitivity to Sounds in Misophony and Phonophobia

Mariola Kokowska[1]

Institute of Psychology of the Polish Academy of Science, Warsaw

Received 28 February 2018 ▪ Revised 20 May 2018 ▪ 29 May 2018

Abstract

The aim of the article is to take a short reflection on the issue concerning the psychological aspects of sound sensitivity – expressed in the phenomenon of misophony and phonophobia. The following description was briefly described: hyperacusis, phonophobia and misophonia, and melophobia, indicating the basic symptoms of disorders in a psychological context.

Keywords: phonophony, misophonia, hyperacusis, sound sensitivity.

1. Introduction

Auditory perception is a complex process of information processing in the form of vibrations of molecules from the environment to the brain, where they are developed and analyzed. The distributed processing of (auditory) information in the brain enables the auditory canal that activates many mental processes (memory, attention) and emotional (in the mesolimbic pathway) and motor reactions. Auditory perception – which is the ability to receive and process sounds, is possible at the level of the auditory analyzer's performance. The sounds are contained in three basic divisions into groups: tones (simple sounds), multitons (complex sounds) and noise. The basic function of the sense of hearing is its defenses, because it enables the reception of stimuli reaching from distant and invisible sources – regardless of the location in space. The sense of hearing allows you to locate potentially dangerous objects in space, giving you the opportunity to assess their direction and distance. Specific sounds alert the organism, preparing to take appropriate actions in response to their perception ("fight or flight"), they are a guidance system for the sense of sight and together with the speech apparatus – it enables interpersonal communication. The sensitivity of the auditory organ for audible tones in the range from 3 to 5 kHz is the highest (hearing threshold) and shows the lowest tolerance for pain thresholds – sounds in this band are perceived as louder, although they generate similar energy levels as in lower and higher bands. The short-term physiological response to noise (noise) involves an increase in the concentration of neurotransmitters: adrenaline, noradrenaline and cortisol (fighting or escape hormones), increased blood glucose, increased heart and blood pressure, exclusion of the digestive system, motor reflexes. Long-lasting physiological response of the body: sleep disorders, chronic fatigue, dizziness and headaches, muscle and chest pain, negative changes in the immune system. The psychological response of the organism includes the emotional sphere: irritability and

[1] PhD student.

Correspondence: Mariola Kokowska, e-mail: movischolar@gmail.com.

irritation, mood variability, decline in mental performance, extended reaction time, reduced precision of movements, at 55-75 dB, the intensity of sounds gives distraction, hinders work and reduces productivity. There are different and varied mechanisms for structural and emotional evaluation of sounds and music. Under the influence of emotions, one can remain indifferent to sounds and music (e.g. in depression, after brain injury, in the Asperger syndrome) (Sachs, 2009: 325), or remain in ecstatic states that are out of control. Emotions can arouse mental-emotional states in which the reception of sounds or music is combined with suffering and the desire to escape. The brain, containing a limbic (emotional) and cortical (logical) part – reacts to stimuli coming from the outside, shaping biochemical and hormonal reactions (neurotransmitters: dopamine, serotonin, noradrenaline, cortisol) through the filter reactions to sounds, noise, music or events as a threat or positively.

Auditory hypersensitivity, i.e. increased sound sensitivity, is associated with reduced sound tolerance, especially defined as specific. Hyperacusibility to most sounds (hyperaccus) or one specific sound (phonophobia) may occur when anomalies appear in the functioning of the ear (e.g. tinnitus), which is usually rare, or in a situation where the functioning of the ear is at a level with no known anomaly of the organ ear (e.g. stress, migraine, insomnia). Changes occurring in the emotional state (especially: anxiety, mood) is a natural defense mechanism, designed to ensure a person's proper functioning in the environment (e.g. by activating the ability to detect a threat). The process of developing sensitivity to sound – it takes place with the involvement of the limbic system (emotions), autonomic (the "fight or flight" reflex) and nervous system, causing the activation of protective mechanisms. In the case of hyperacusis – it is a state of increased arousal caused by the presence of sound amplification in the central auditory pathways, in phonophobia – it is an automatic response in the form of fear and fear of sound, while in misophony – it is immediate (subconscious) appearance of negative emotions (irritation, irritability, anger, aggression) in contact with unpleasant sounds that are perceived by others as natural and do not cause resentment or aversion. Mechanisms with hyper acoustic properties (hyper-sound sounds too much) are embedded in the processes of spinal sound processing and changes in the central auditory processing (with a normally functioning inner ear), however phonophobic (very strong aversion, fear, fear, fear of sound) and misophonic (aversion to a given sound, noise) have support in normal hearing, but psychological factors co-decide on the state of high sensitivity to certain specific sounds.

2. Hyperacusis

Hyperacusis is a state of reduced tolerance to most types of lower frequency sounds (eg water noise in the tap, leaf movement, car sound) that appear above a certain intensity threshold. Such a condition may appear under the influence of neurological conditions (Knipper, 2013; Middleton et al., 2011), post-traumatic stress disorder (PTSD), migraine, tinnitus, head injuries, borreliosis, brain infections (Baguley, 2003). Feeling uncomfortable in exposure to low sound frequencies is considered to be an auditory processing disorder. In the hyperacusis state, weakened tolerance of the average listener to normally audible sounds appears (over 40 dB is considered as noise), creating discomfort (Sun et al., 2011). Sensitivity to low-intensity sounds (eg listening to a conversation in a room) may cause a sense of pain – ordinary and mundane environmental noises are unbearable, causing attention to the pursuit of silence.

It is observed that people with hyperacusis and low level of UCL (Uncomfortable Loudness Level), which changes depending on the sound stimulus – may experience misophonia or phonophobia (Ratajczak & Skarżyński, 2017). Phonophony and misophonia can exist independently of one another or coexist with one another and hyperacusis (Raj-Koziak et al., 2006), whereas misophonia can lead to hyperacusis, i.e. changes in central auditory processing.

3. Psychological aspects of sound perception - tenderness

Reduced tolerance to certain aspects of sound – reflecting the involvement in this process of emotions, is an expression of excessive sensitivity to its effects and is associated with several phenomena, referred to as: hyperacusis, misophonia and phonophobia. These phenomena differ from each other, giving a different description of the characteristics of those affected. The extremely high activation of the auditory system is characteristic of people who experience discomfort associated with the perception of sounds. It is worth mentioning that the term "misophonia" is a broader term for the term phonophobia, signifying strong aversion or hatred (aversion) to a particular aspect of sound. This concept includes and describes symptoms in people who feel and express a large variety of negative emotions generated by sounds. The term phonophobia is a narrower term compared to misophonia, because it is a description of a specific type of misophonia, a diagnostic situation in which fear and anxiety – being negative emotions, dominate in relation to the manifested dislike of sound (Jasterboff & Jasterboff, 2001). Most people with reduced tolerance to sounds show symptoms of misophonia (they do not like certain sounds), but among them you can meet some people with typical signs of phonophobia (i.e. they are afraid of exposure to a specific sound).

3.1 *Phonophobia*

The problem of phonophobia has the psychological basis of its appearance and is a specific form of misophonia. Phonophobia is affected by people expressing fear of selected sounds or all sounds, which is associated with abnormalities in the excitation of the limbic system (amygdala and reclining – they are responsible for emotional reactions to music) and the autonomic nervous system. Phonophobia – it is fear of exposure to a specific sound. The term phonophobia – means hypersensitivity to loud sounds, which is manifested by aversion to sound as well as anger and anxiety (Hérbert et al., 2013; Jastreboff & Jastreboff, 2000). Auditory hypersensitivity is a phenomenon consisting in reduced tolerance to perceived sounds (Tyler et al., 2014). Anxiety and emotional tension before a loud sound is manifested by irritation due to the occurrence of certain sounds and fear of issuing one's own voice. Sometimes, in extreme cases, phonophobia can lead to misophony, or hatred of sounds. Phonophobia, called acoustic phobia, is diagnosed in migraine as one of its three components [(a) headache, (b) phonophobia or migraine aura, (c) photophobia)] (ICHD-3) (Fliciński et al, 2014; Głąbiński & Juszczak, 2012) and in a situation where the possibility of hyperural hypersensitivity is eliminated, which is associated with tinnitus or hyperalgesia to sounds of a certain volume, although they may be objectively perceived by others as silent. Phonophobia develops when the autonomic nervous system and the limbic system are over-excited (Baguley & McFerran, 2011), especially in the areas responsible for emotions – in a situation of properly developed, healthy hearing aids. The specific sound that appears on the average or low volume is selectively intolerable, causing discomfort. In the phenomenon of misophonia and phonophobia, the effect of the amygdala, taking part in fear conditioning, depression or tinnitus, is noticed (Baguley, 2014). In response to the perception of sounds audible in everyday life (e.g. ticking of the clock, footsteps, creaking doors, breathing, munching, snoring, sniffing), a person with phonophobia reacts with excessive clarity losing control of behavior: he escapes in a panic, isolates himself from the environment is distracted, irritated, scared and evil (Pienkowski et al., 2014). He/she wants to avoid hearing contact with the stimulus at all costs. It also does not tolerate people who are a relay subjectively perceived as uncomfortable – noises. The subjective feeling of a person covered by phonophobia and hypersensitivity as well as tinnitus occurs in a situation of tiredness and an increased level of stress (Sahley & Nodar, 2001). During such a condition in the area of the auditory cells, the effect of the neurotransmitter, i.e. glutamate, is increased – causing the subjective perception of sound as too loud (Sahley, 2001).

Bad noise abatement is not related to hearing thresholds (from 0 dB, to 130 dB – pain), measured in decibels on a logarithmic scale (dB). Sound, treated as any pressure change heard by the human ear (Brüel & Kjaer, Prusak, 2004), in the subjective sense of volume – is determined by various factors. Indication that the human ear has unequal sensitivity to the frequency range (2kHz to 5kHz) and differently differentiates frequencies at low and high sound pressure levels (SPL). Sounds of the so-called impulse (short, lasting less than 1 s) or otherwise called impulse make the ear less sensitive to their volume than to longer lasting sounds (Brüel & Kjaer).

Components of musical perception (i.e. melody, rhythm, harmony, tonality, timbre) are based on different psychological mechanisms of auditory perception, having a neuronal, emotional, aesthetic, socio-cultural background. The variety of experiences not related to music (e.g. autobiographical, traumatic, positive, etc.) and music as well as musical training or its lack in human development, allows to develop reflection on understanding and understanding the regularity and specificity of the processing of sounds and music in contact with other people. Experiencing sounds and music is associated with the perception of a selective and comprehensive representation of symbols and ambient sounds, which are supported by an automatic and unconscious simulation mechanism, supporting the resources of the unit equipped with luggage of all types of experiences (with negative vs positive profile).

3.2 *Melofobia*

A specific variation of the phobia associated with sounds and music is melophobia (Greek melopoeia = the art of creating a melody, phobia = fear), i.e. fear of music with the dominant aspect of the melody. Sounds that form a structurally melody can be experienced by people with melophobia and are subjectively perceived as unpleasant, causing persistent fear or hatred of music. Sensory experiences (including auditory and related musical aesthetics) open the mind to the memories stored in it that may have positive or negative connotations. Melodies (eg themes or melodic phrases), creating subjective references and analogies to the perceived as unpleasant situations, objects, phenomena (music) – can arouse unjustified, disproportionate fear and experience of anguish, accompanied by strong physiological reactions and vegetative-somatization symptoms.

It is indicated that specific phobias (e.g. melophobia) (F.40) cause serious disturbances in life of about 0.2% of the population (Leder & Siwiak-Kobayashi, 2006), although in human development, the fear of specific objects is natural (Szpecht-Tomann, 2009). Anxiety, having a structure composed of a triad of components (physical – I feel, cognitive – think, behavioral – I do) (Mattis & Ollendick, 2002) – is a derivative of the disproportion between the perceived element of reality creating a sense of threat (melophobia is, for example, the entire melody, phrase melodic, etc.) (i.e., primary cognitive appraisal) and confrontation with this situation, i.e. the possibility of dealing with it (i.e. secondary cognitive appraisal).

3.3 *Misophonia*

Misophonia is a term introduced by P. and M. Jastreboff, which means hatred/aversion to sounds – occurring in contact with another person (sometimes an animal), generating nuisance sounds (Cavanna & Seri, 2015). Misophonia is defined by the abbreviation SSS (i.e. sound narrow sensitivity syndrome). Misophony is triggered by neurological factors that cause the person affected to be particularly sensitive to sounds issued by other people with whom he is in close and frequent contact. It becomes a physical sign of the reluctance accumulated over the years by the other person who causes these sounds. Usually people with misophonia show subjective sensitivity to specific sounds (of average loudness), not being able to tolerate the dynamics of emerging sounds (objectively neutral) – issued by the environment or by other people in the context of situations and activities (e.g. eating, moving, gestures) that accompany these

sounds. Misophonia presents the state of neurological or sensory processing disorder (e.g. in autism, Asperger's syndrome, ADHD), in which the experience of certain sounds can cause psychological stress, because they become unbearable. Sensory information received from the environment causes improper interpretation of auditory, visual, tactile, balance, fragrance and social signals. A person afflicted with misophonia, or an excessively intense response to hypersensitivity to sound stimuli of a particular pattern or meaning (Jastreboff & Jastreboff, 2002) – loses the sense of time, space and movement, which is felt as a difficulty occurring in the life of a person who affects the ability to achieve life goals (Wu et al., 2014). The disproportionately strong emotional reactions to sound/movement indicate an autonomous arousal and unpleasant emotional experience – triggering fear, disgust, anger (Edelstein et al., 2013) for a specific set of sounds: trivial noises, food noises, rocking the feet, munching, clock ticking, chewing gum, tapping with your fingers, etc. Sensitivity of this type appears in childhood, shaping patterns of recognition leading to subsequent intolerance of sounds coming from other people (train, plane, engine) or animals (Cavanna & Seri, 2015).

There are few studies presenting the clinical spectrum of misophonia. The results of one of them indicate that misophonia co-occurs with mood disorders, anxiety disorders, depressive disorders, dysthymia, obsessive-compulsive disorder and psychoneuroticism, which have higher rates than in the general population (Schröder et al., 2013).

According to the criteria of the Diagnostic and Statistical Manual Disorders (DSM), indications indicating misophonia are based on observations (Schröder et al., 2013): (1) the presence or prediction of a specific sound produced by man (sounds of food, breathing) trigger an impulsive physical reaction that begins with irritation or disgust, immediately becoming angry; (2) anger initiates a deep sense of loss of self-control, which manifests itself in rare but potentially aggressive explosions; (3) the person recognizes that anger or disgust is excessive, unreasonable or disproportionate to the circumstances or provoking stressor; (4) the person seeks to avoid a misophonic situation; if he does not avoid it, he experiences the sound situation with great discomfort, anger, distaste; (5) cause of anger, disgust or avoidance of the person significant stress (i.e., disturbs the person for whom he has anger or disgust) or significant interference in the daily life of the person (e.g. anger or disgust can cause it difficult for a person to perform important tasks at work, meet new friends, attend classes or interact with others); (6) anger, disgust and avoidance are not better explained by other disorders, such as obsessive-compulsive disorder (eg disgust with someone obsessed with pollution) or post-traumatic stress disorder (e.g. avoiding stimuli related to trauma associated with the threatened death, serious injury or threat to physical integrity of yourself or others).

Misophonia (Greek *misos* = hatred, *phone* = sound) is considered a definite set of auditory and neurological symptoms (Jastreboff & Jastreboff, 2001; Edelstein, Brang, Rouw & Ramachandran, 2013, Ledoux, 2015). The research suggests that misophonia exists in relation to several constructs: anxiety, obsessive-compulsive symptoms, disability, general sensory sensitivity, depression. Absorption of certain types of sounds may adversely affect the feelings of people with obsessive disorders that show symptoms of suffering, irritability, irritability, aggravating quickly to anger (features of misophonia), or anxiety (a feature of phonophobia) (Schroder et al., 2013), which leads to actively avoid sounds that cause suffering (McGuire et al., 2012). Studies also indicate that misophonia is a positive association with anxiety and/or depressive symptoms (moderate, positive correlations) and with general sensory sensitivity, which is thought to be associated with the possibility of selective sound sensitivity (Baguley & McFerran, 2011). The nature of emotional and behavioral reactions as well as neurobiological misophonia is subjected to measurement by means of research methods that allow to determine the connections between disorders and the spectrum of attributes assigned to this unit. It is assumed that in a person affected by mellophilia (e.g., knocking, chewing, scratching, shuffling objects, clicking, etc.) there is an immediate aversive reaction to some sounds that are perceived as specific acoustic

(sometimes visual) patterns in relation to a known person. Regardless of their loudness measured by decibels (dB), sounds play the role of stimuli triggering emotional and behavioral reactions (Edelstein et al., 2013). In the context of the study of people with depression and anxiety (Arch, 2012), misophonia – understood as hypersensitivity to a specific sound, may promote the assumption that irritability, which is a component of depressive and/or anxiety disorders – may favor a decrease in the tolerance threshold for mild and harmless in terms of volume stimuli. Among the audiologists there are opinions that increased emotional reactions to certain sounds are possible to explain the so-called hyper-connectivity, occurring between nervous, limbic, autonomic systems and the specificity of PTSD disorder and affective disorders: obsessive-compulsive, mood (e.g. depression). In the diagnosis of misophonia, the influence of the perceived auditory stimulus (trigger) on the psychophysiological response (i.e. the level of irritation, reluctance or fear, tendency to escape) should be determined, which allows to differentiate hyperacusis from misophonia or phonophobia. Quantitative methods that use questionnaires and imaging (eg fMRI, indicating an increase in brain activation in the presence of hyperacusis) serve this purpose (Kramar et al., 2017).

4. Incentives (triggers) in misophony

Misophonia – understood as an emotional aversion to sounds, contains some similarities with the term that defines misokinesis (misocinesia), or the state of aversion (hatred) to movement. This means that certain body movements in space can cause a trigger reaction. The triggering stimuli are considered from the perspective of two subgroups as: (1) key stimuli, that is, they play their role in a side way; (2) triggers, having a social background, the emergence of which is associated with evolution and acting as a signal (e.g. trembling of feet, crunching etc.) (Żywiczyński & Wacewicz, 2015). Hearing triggers can be any repetitive sound, felt as oppressive. There may also be visual stimuli triggering repetitive movements (e.g. hair turning) and movements associated with auditory triggers (e.g. jaw movement) (Jastreboff & Jastreboff, 2014; Wu et al., 2014). Ordinary, simple activities, gestures and sounds of everyday life can become a stream of triggers activating in a specific context of the situation (e.g. during a meal), generating an aspect of fight or flight. Even a brief exposure to the triggers of misophonia is the cause of immediate disclosure of anger and anger and disgust, which are a difficult to bear experience (Schneider & Arch, 2017). The environment is recognizable by the human being on the basis of sounds that reach it (e.g. noise), which is an encoded showcase of situationally defined contexts. Daily sounds, perceived by the majority of the population as ordinary, not very significant, but being the opposite of silence, are perceived by a person with misophonia as particularly significant and causing aversion. Research indicates that sounds that have bodily and physiological connotations are considered the most repulsive – i.e. bodily excretion and the sound of secretions (e.g. vomiting, sniffing, coughing, spitting). In addition, results that do not link specific sounds with the reaction of disgust or avoidance allow us to suppose that reactions to certain sounds (causing disgust) can be acquired in the process of social learning and attributed to culturally significant values as acceptable or unacceptable to the public (Cox, 2014). In misophony, sounds are perceived as something more than irritating – they cause a strong impulsive reaction expressing anger and aggression.

Acoustic stimuli that can trigger in contact with categories of communication acts (eg gesture) (Nęcka, 2000: 53). Negative reactions (trigger stimuli) in emotionally-behavioral recipients may be, for example:

(a) stimuli perceived in contact with food (noises: munching, swallowing, bouncing, chewing, slurping, crunching, swallowing, licking, spitting, sucking, moisturizing lips, etc.); (b) stimuli received in contact with the process of breathing of other people (noises: snoring, grunting, groaning, sniffing); (c) vocal stimuli and vocalizations – sounds related to pronunciation,

articulation and originating from the larynx (whispers, whistles, buzzing, muffled conversations, repetition or confusion of words, inappropriate singing, babbling); Non-verbal gestures in connection with speech and vocalization are treated as an act of speech (linguistic behavior) and included in the category of acts of communication (Nęcka, 2000: 53). The communication act contains a semantic event, independently or depending on the context of the situation; (d) stimuli associated with the body movement in space and/or referring to gestures (noises: bare feet on the carpet or floor, shuffling, heels, nail biting, scratching, specific gestures).

The movement of the body in space refers to sounds, issued to the relationship between interpersonal communication (involuntary or volitional) on the cognitive-emotional-behavioral level. Every expressive movement that expresses emotion or thought – made by any part of the body – is integrated into the set of gestures. Gestures are called those actions that clearly characterize the intended expression and are not interpreted by the recipient as serving other purposes (e.g. practical) than volitional and expressive (Oxford English Dictionary, for: Kendon, 2004). Gestures are also defined as actions that are a spontaneous movement of hands synchronized with speech (McNeill, 1992) or instrumental actions that are a physical action oriented to gripping with the help of hands (Fogassi & Ferrari, 2004). Articulation movements, which are the act of speech, are understood as a kind of gestures and constitute an integral component of the communication process.

Behaviors that are represented by gestures in the concept of gestures of gestures (McNeill, 1992, 2005, 2012) are placed on the axis according to three criteria: (1) the intensity of speech presence decreases; (2) the increase in the presence of linguistic attributes is increasing; (3) the conventionalisation of the sign treated as a gesture increases. This axis is made up of: gestures – gestures embedded in the language – pantomime – emblems – sign languages.

The gesticulation accompanying the sounds, perceived by people with misophonia as exaggerated and irritating, refers to movements of the hands and other parts of the body appearing in the course of speaking (Kendom, 2004; Goldin-Meadow, 2010) having a spontaneous character. Gestures that are subject to classification are distinguished into:

(a) iconic – that is, having semantic similarity to the content of the expression, they express certain objects or actions in the shape of a gesture as a whole or trajectory of the movement of hands (Juszczyk, 2011);

(b) batts (beats = strokes) – i.e. gestures having the same form (e.g. rhythmic movements of the hands, feet, arm on the top-bottom axis) without references to the meaning of the statement, but synchronized with the rhythm of the prosodic expression (Efron, 1941; McNeill, 1992). The musical analogies reflect the nature of the accented rhythm of speech: the phonetic and gestural components of the statements are intended to emphasize the semantic and modal intention of the sender, which is related to the emotions of participants in the communication exchange. Negative emotions appearing in a person with misophonia when receiving a sequence of baton gestures, may sensitize them in contact with another person (usually close to);

(c) deictic (pointing) – these are gestures that are contextual and relational. They are related to the mental ability to change the cognitive position in the environment, or the deictic shift (Stockwell, 2006) in the "body language".

The gesture modifies the state of affairs between the recipient with the diagnosis of misophony and the sender of the message (without misophony), imposing (unconsciously or consciously) the way of reading the message. The behavior of a person who is in a specific relationship with a person with the characteristics of misophonia is the carrier of communication information with intent / no intentions. The accompanying acoustic sound strengthens or sustains the content expressed by gesture. Reception of the sender's intentions (without misophony) is distorted by hypersensitivity and negative emotional assessment of the acoustic signal associated

with a specific sequence of gestures or gesture by a person affected by mellopathy. Communication neutral activity of a non-verbal sender (people without philosophy) (e.g. neurological nature) can be interpreted by the recipient (with misophonia) at the level of intentions passed on by the other person, giving it a negative sense of communication – triggering irritation or anger (in reaction fight/flight).

(d) visual stimuli related to sound (sounds: drilling, abrasion of the wall or on the board, whistling of a kettle of a given color and volume level (Fenko, Schifferstein & Hekkert, 2011). The Pantomime creates a separate group of gestures that can be referred to mimetic concepts. Mimeza (mimesis) means the ability to represent mentalities that are spontaneous, intentional initiation or memorization of movement patterns (throwing objects, jumping, step dance) that are detached from a particular subject or action. They represent sequences of movements that are not necessarily activated by the principle of an unconditional response to the stimulus, which means that the person can recall them at any time from memory or imagine.

5. Research tools

In order to understand the mechanism of the formation of misophonia, several questionnaires were developed, which are still in the process of checking their credibility: (1) Multiple-Activity Scale for Hyperacusis (MASH); (2) Misophonia Activation Scale (MAS-1); (3) the Amsterdam Misophonia Scale (A-MISO-S) (Schroeder et al., 2013) – a tool with reference to obsessive-compulsive disorders, hence it is not clear how much Misophonia measures; (4) Misophonia Questionnaire (MQ) (Wu et al., 2014) – a tool correlating with sensory hyperreactivity; (5) Misophonia Assessment Questionnaire (MAQ) (Johnson, 2001); (6) Misophonia Assessment Questionnaire (Dozier, 2015); (7) Coping Response Survey (Dozier, 2015).

In the diagnostics of misophonia and phonophobia one should take into account the multidisciplinary perspective, which focuses on various scientific disciplines: audiology, primary health care and specialist care (e.g. neurology), psychological, psychiatric and psychotherapeutic help.

6. Therapeutic interventions in the treatment of phonophobia and misophonia

6.1 Cognitive Behavioral Therapy

Cognitive Behavioral Therapy (CBT) and dialectical behavioral therapy (Dialectical Behavior Therapy – DBT) (Linehan, 2014) are one of the psychological and psychotherapeutic methods applied to people with mofophy and phonophobia. It contains two main components: cognitive (ie cognitive restructuring) and behavioral (i.e. behavior modification), which do not use sounds or external signals, but take into account the science of recognizing the negative stimuli and thoughts associated with them, and the attention and imagination control processes (Greimel & Kröner-Herwig, 2011).

CBT therapy is supported by interventions in the field of audiology (sound generators), pharmacotherapy – especially in phonophobia (treatment of anxiety and depression), Neurofeedback, mindfulness-based interactions (MBSR) and relaxation, listening trainings and ACT-Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 1999; Hayes, Strosahl & & Wilson, 2012) – emphasizing acceptance of emotions instead of reducing the symptoms of misophonia (Schröder et al., 2013).

6.2 *Habituation*

The habituation method (TRT – Tinnitus Retraining Therapy) – includes a stage of therapeutic consultations and sound therapy, where the time spent on therapy lasts from 18 to 24 months. This type of program is aimed at reversing inappropriate beliefs responsible for generating aversive response to sound (unwillingness to specific sounds in misophony) or fear of sound (in phonophobia). The process of desensitization (desensitization) to sounds that cause discomfort, which has references to the sources of development of hypersensitivity and anxiety – maintained by the individual, but felt as real or imaginary, takes a relatively long time. The habituation therapy – originally intended for the treatment of tinnitus, consists in getting accustomed to and replacing sounds that evoke negative emotions by associating them with sounds considered pleasant (e.g. with a fragment of a musical piece).

Therapeutic interventions using this method are addressed in particular to people with phonophobia, for whom an anxiety situation is less artificial than in the natural environment, gradually reducing the intensity of anxiety reactions to negatively perceived auditory stimuli. So far, the effectiveness of treatment with TRT has not been confirmed in empirical studies (Schneider & Arch, 2015), however CBT therapy is recommended as treatment (Bernstein, Angell & Dehle, 2013; McGuire, Wu & Storch, 2015).

7. Conclusion

Within the issues related to the psychological aspects of hypersensitivity to sounds, recognized as a type of disorders, there are relatively few uncertainties. They refer to the methodology of research carried out in the context of misophonia and phonophobia, where measurement tools are still part of the process of verifying their diagnostic reliability. The annoyance of the symptoms of misophonia and phonophobia – occurring on several levels under the name of specific phobias, is a significant public health problem. To experience a strongly negative emotional reaction in the context of the perception of sound hypersensitivity requires further research. Quality of life – as a subjective sense of the level of satisfaction and satisfaction going from life understood as the whole experience or its individual spheres, requires care for its improvement and providing positive emotional experiences with the support of diagnostic and therapeutic methods.

Acknowledgements

The article has no specific fund.

Conflict of interests: none.

References

Arch, J. J., Eifert, G. H., Davies, C., Vilardaga, J. C. P., Rose, R. D., & Craske, M. G. (2012). Randomized clinical trial of cognitive behavioral therapy (CBT) versus acceptance and commitment therapy (ACT) for mixed anxiety disorders. *Journal of consulting and Clinical Psychology*, *80*(5), 750.

Baguley, D. M. (2003). Hyperacusis. *Journal Roy Soc Medicine*, *96*, 582-585.

Baguley, D. M., & McFerran, D. J. (2011). Hyperacusis and disorders of loudness perception. In: A. Møller, B. Langguth, D. de Ridder, & T. Kleinjung (Eds.), *Textbook of tinnitus* (pp. 13-23). New York, Dordrecht, Heidelberg, London: Springer.

Bernstein, R., Angel, K. L., Dehle, C. M. (2013). A brief course of cognitive behavioural therapy for the treatment of misophonia: a case example. *The Cognitive Behaviour Therapist*, *6*(e10), 1-13.

Baguley, D. M. (2003). Hyperacusis. *Journal of the Royal Society of Medicine*, *96*(12), 582-585.

Cavanna, A. E., & Seri, S. (2015). Misophonia: Current perspectives. *Neuropsychiatric Disease and Treatment*, *11*, 2117-2123.

Cox, T. (2014). *Sonic wonderland: A scientific Odyssey of sound*. London: The Bodley Head.

Dozier, T. H. (2015a). Counter conditioning treatment for misophonia. *Clinical Case Studies*, *14*, 1-14.

Edelstein, M., Brang, D., Rouw, R., & Ramachandran, V. S. (2013). Misophonia: Physiological investigations and case descriptions. *Front Hum Neurosci*, *7*, 296.

Efron, D. (1941). *Gesture and environment*. New York: King's Grown Press.

Fenko, A., Schifferstein, H. N. J., & Hekkert, P. (2011). Noisy products: Does appearance matter? *International Journal of Design*, *5*(3), 77-87.

Fliciński, J., Żarowski, M., & Steinborn, B. (2014). New classification of the International society of headaches. Differences and similarities between ICHD-3 beta and ICHD-2. *Pediatric Neurology*, *23*(46), 39-44, 43.

Głąbiński, A., & Juszczak, M. (2012). Dizziness – Selected practical issues. *Current Neurol*, *12*(4), 251-258.

Hébert, S., Fournier, P., & Noreña, A. (2013). The auditory sensitivity is increased in tinnitus ears. *J Neurosci*, *33*(6), 2356-2364.

Goldin-Meadow, S. (2010). When gesture does and does not promote learning. *Language and Cognition*, *2*(1), 1–19.

Greimel, K. V., & Kröner-Herwig B. (2011). Cognitive behavioral treatment (CBT). In: A. Møller, B. Langguth, D. de Ridder, & T. Kleinjung (Eds.), *Textbook of tinnitus* (pp. 557-561). New York, Dordrecht, Heidelberg, London: Springer.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2012). *Acceptance and commitment therapy: The process and practice of mindful change* (2nd ed.). New York, NY: Guilford Press.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy*. New York: Guilford Press.

Jastreboff, P. J., & Jastreboff, M. M. (2000). Tinnitus retraining therapy (TRT) as a method for treatment of tinnitus and hyperacusis patients. *J Am Acad Audiol*, *11*(3), 162-77.

Jastreboff, M. M., & Jastreboff, P. J. (2001). Components of decreased sound tolerance: Hyperacusis, misophonia, phonophobia. *Audiology Online*, June 2001, http://www.audiologyonline.com

Jastreboff, M. M., & Jastreboff, P. J. (2002). Decreased sound tolerance and tinnitus retraining therapy (TRT). *Aust N Z J Audiol*, *24*, 74-84.

Jastreboff, P. J., & Jastreboff, M. M. (2014). Treatments for decreased sound tolerance (hyperacusis and misophonia). In: *Seminars in Hearing*, Vol. 35 (New York, NY: Thieme Medical Publishers), 105-120.

Juszczyk, K. (20111). Multimodal mental model of meanings in instructional dialog files. *Studies in Cognitive Science and the Philosophy of Mind*, *5*(1), 39-58.

Kendom, A. (2004). *Gesture: Visible action as utterance*. New York: Cambridge University Press.

Knipper, M., van Dijk, P., Nunes, I., Ruttiger, L., & Zimmermann, U. (2013). Advances in the neurobiology of hearing disorders: Recent developments regarding the basis of tinnitus and hyperacusis. *Progress in Neurobiology*, *111*, 17-33.

Brüel & Kjaer (2018). http://www.bruel.com.pl/produkty/identyfikacja-zrodel-dzwieku-i-drgan/pomiar-natezenia-dzwieku/ Accessed 29 May 2018.

Kumar, S., Tansley-Hancock, O., Sedley, W., Gander, P. E., Bamiou, D-E., & Griffiths, T. D. (2017). The brain basis for misophonia. *Current Biology*, *27*, 1-7.

Leder, S., & Siwiak-Kobayashi, M. (2006). Neuroses. In: A. Bilikiewicz (ed.), *Psychiatry. Handbook for medical students*. Warsaw: PZWL Medical Publishing.

Mattis, S. G., & Ollendick, T. H. (2002). *Panic disorder and anxiety in adolescence*. Malden, MA: BPS Blackwell.

Linehan, M. M. (2014). *DBT® skills training handouts and worksheets*. Guilford Publications.

Middleton, J. W., Kiritani, T., Pedersen, C., Turner, J. G., Shepherd, G. M., & Tzounopoulos, T. (2011). Mice with behavioral evidence of tinnitus exhibit dorsal cochlear nucleus hyperactivity because of decreased GABAergic inhibition. *Proc. Natl. Acad. Sci. U.S.A.*, *108*, 7601-7606.

Nęcki, Z. (2000). *Interpersonal communication*. Krakow: Antykwa.

Pienkowski, M., Tyler, R. S., Rojas Roncancio E, Jin Jun, H., Brozowski, T., Dauman, N. et al. (2014). A review of hyperacusis and future directions: Part II. Measurement, mechanisms, and treatment. *Am J Audiol*, *23*, 420-436.

Prusak, J. (2004). Sound level meters, from Bruel & Kjaer, Sound & Vibration A/S. *Measurements Robotics Automation*, *7*(3), 50-51.

Raj-Koziak, D., Bartnik, G., Fabijańska, G. Borawska, B., i Szymańska, E. (2006). Studium przypadku pacjenta z obniżoną tolerancją na dźwięki i współistniejącym szumem usznym oraz niedosłuchem [Case study of a patient with reduced tolerance to sounds and concomitant tinnitus and hearing loss]. *Audiofonologia*, *29*, 7-10.

Ratajczak, A. i Skrżyńska, P. H. (2017). Zjawisko nadwrażliwości słuchowej – przegląd piśmiennictwa [Phenomenon of auditory hypersensitivity – Review of the literature]. *Nowa Audiologia*, *6*(1), 16-21.

Sachs, O. (2009). *Musician: Stories about music and the brain*. Poznań: Zysk i Sk-a Publishing House, 325.

Sahley, T. L., & Nodar, R. H. (2001). A biochemical model of peripheral tinnitus. *Hear Res*, *152*(1-2), 43-54.

Schneider, R. L., & Arch, J. J. (2017). Case study: A novel application of mindfulness – and acceptance – based components to treat misophonia. *Journal of Contextual Behavioral Science*, *6*, 221-225.

Schröder, A., Vulink, N., & Denys, S. (2013). Misophonia: Diagnostic criteria for a new psychiatric disorder. *PLoS ONE*, *8*, e54706.

Szpecht-Tomann, M. (2009). *When the child is afraid*. Warsaw: PAX.

Stockwell, P. (2006). V. Evans, M. Green: *Cognitive linguistics. An introduction* (166-197). Edinburgh.

Sun, W., Manohar, S., Jayaram, A., Kumaraguru, A., Fu, Q., Li, J., & Allman, B. (2011). Early age conductive hearing loss causes audiogenic seizure and hyperacusis behavior. *Hear. Res*, 282, 178-183.

Tyler, R. S., Pienkowski, M., Rojas Roncancio, E., Jin Jun, H., Brozowski, T., Dauman, N. et al. A review of hyperacusis and future directions: Part 1. Definitions and manifestations. *Am J Audiol*, *23*, 402-419.

Wu, M. S., Lewin, A. B., Murphy, T. K., & Storch, E. A. (2014). Misophonia: Incidence, phenomenology, and clinical correlates in an undergraduate student sample. *J. Clin. Psychol.*, *70*, 994-1007.

Żywiczyński, P. & Wacewicz, S. (2015). *Evolution of language. Towards gestural hypotheses*. Toruń: Scientific Publisher.


C O A S