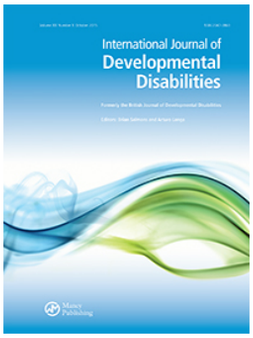

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Examining the correlation between misophonia symptoms and autistic traits in general population

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Introduction: The purpose of the present study was to investigation the relationship between misophonia symptoms and autistic traits in adults. In accordance with this investigation, the purpose of the present study was to determine whether misophonia is a symptom of autism.
Method: The study included 445 participants without psychiatric disorders or hearing impairments. Self-report questionnaires were utilized to evaluate the severity of misophonia symptoms and autistic traits. On the basis of the results of the self-report questionnaires, statistical analyses were conducted.
Results: Misophonia scores were found to be higher in females than in males but did not correlate with age, smoking, or alcohol consumption. Examining the autistic characteristics reveals that gender, age, and smoking have no effect on the total autism scores. Examining the association between the degree of misophonia and autistic traits reveals that they have a considerable impact on one another.
Discussion: Our findings indicate that there is a correlation between the severity of misophonia and autistic traits. However, our limitations and the fact that some of our results differ from those of previous research indicate that additional research is necessary in this area.

Keywords: misophonia; autistic traits; smoking; drinking; gender

Introduction

The term 'misophonia', first used by Jastreboff in 2001, is a person's disproportionate emotional response to other people's everyday sounds, animal sounds, and ambient sounds such as keyboard and pen tapping, regardless of decibel (Jastreboff and Jastreboff 2001,Jastreboff and Jastreboff 2014, Bernstein *et al.* 2013, Edelstein *et al.* 2013, Schröder *et al.* 2013, Kumar *et al.* 2014, Schneider and Arch 2017, Erfanian *et al.* 2019). In many studies, it has been stated that the emotional reactions experienced by people can be severe reactions such as distress, discomfort, anxiety, anger, disgust, hatred, and sometimes loss of control (Schröder *et al.* 2013, Kumar *et al.* 2014, Wu *et al.* 2014, Dozier 2015, Boyce 2015). Various sounds, such as breathing, wheezing, chewing, eating, slurping, lip smacking, pen clicking, writing, or cracking knuckles, that cause these reactions are defined as misophonic triggers (McKay *et al.* 2018, Schröder *et al.* 2013, Kumar *et al.* 2014, Sanchez and Silva 2018). Since studies on misophonia are new and few in number, there is no definite information about its prevalence. According to the results obtained from various studies, its prevalence in the general population is estimated to be around 3% (Jastreboff and Jastreboff 2014). A study done in Turkey found that 12.8% of people have misophonia, and 43.5% of people with misophonia said that they had first-degree relatives with similar symptoms (Kılıç *et al.* 2021). This suggests that genetic transmission may have an effect on misophonia.

A growing number of studies have attempted to shed light on the clinical manifestations of misophonia. However, the question of whether misophonia is a disease alone or a symptom of psychiatric disorders accompanied by sensory sensitivity remains controversial. According to DSM-5 diagnostic criteria, increased or decreased sensitivity to sensory stimuli is a feature of autism spectrum disorder (ASD). In a recent study, Rinaldi *et al.* found that autistic traits were higher in individuals with misophonia (Rinaldi *et al.* 2022). One of the researchers working on misophonia around the world, Williams *et al.*, did a study comparing the severity of misophonia in autistic and non-autistic populations. They found that autistic people had worse misophonia symptoms than non-autistic people

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(Williams *et al.* 2022). This begs the question of whether or not misophonia is an ASD symptom. There is various evidence for the relationship between ASD and misophonia. Misophonia is associated with a variety of neurodevelopmental disorders, such as attention deficit hyperactivity disorder (ADHD) and tic disorders, and its intensity changes with the treatment of these conditions (Martino and Hedderly 2019, Norris *et al.* 2022). This shows that autism, one of the most prevalent neurodevelopmental disorders, and misophonia may be related. Another of these points of evidence is that the comorbidities that can accompany both conditions are similar. Compared to individuals without misophonia, those with misophonia exhibited distinct differences in perfectionism, depression, anxiety sensitivity, and obsessive-compulsive disorder (Cusack *et al.* 2018, Eijsker *et al.* 2019, Jager *et al.* 2020). These characteristics are known to be associated with autism spectrum disorder (ASD) (Greenaway and Howlin 2010, Meier *et al.* 2015). Another piece of evidence is that people with misophonia have more autistic personality traits than those without (Rinaldi *et al.* 2022). Nonetheless, it should be underlined that although people with ASD are sensitive to sudden and unexpected sounds, persons with misophonia are sensitive to mild sounds in everyday life (Robertson and Simmons 2013, Tavassoli *et al.* 2014). These differences make it difficult to determine the nature of the association between misophonia and ASD. There is a need for additional research to elucidate the association between misophonia and ASD.

According to our research, there is only one study examining the relationship between misophonia and autistic characteristics. In this study, the autistic symptoms of individuals with misophonia were compared with those of the control group (Rinaldi *et al.* 2022). In our study, the relationship between misophonic symptoms and autistic traits was investigated in a normal sample without a psychiatric disorder diagnosis. In light of the preceding information, we hypothesized in our study that as the severity of misophonia symptoms increases, so will autistic traits.

Method

Participants

After reading the consent form, The Amsterdam Misophonia Scale-Revised (AMISOS-R) and the Autism Spectrum Quotient (AQ) were administered to 500 students between the ages of 18 and 28 at the Isparta Süleyman Demirel University Faculty of Medicine. The criteria for exclusion from the study were: (1) the existence of a psychiatric disorder (e.g. depression, bipolar disorder, anxiety disorder, ADHD), (2) a history of taking psychotropic medications, (3) the existence of hearing problems (e.g. partial deafness).

The study procedures adhered to the 2013 version of the Declaration of Helsinki and all applicable local laws and regulations governing human research. The SDU ethics committee approved the study protocol (2022/18-251).

Instruments

Data form

We used an interview form to gather information about the socio-demographic characteristics of the participants, such as age, gender, and comorbid mental illnesses.

Autism Spectrum Quotient (AQ)

It was developed by Baron-Cohen *et al.* as a self-assessment screening instrument to determine the degree to which people with normal intelligence exhibit autistic symptoms (Baron-Cohen *et al.* 2001). It is a 50-item self-report questionnaire examining subclinical autistic symptoms (Işik *et al.* 2020, Rinaldi *et al.* 2022). There are 4 possible responses for each item (definitely agree; slightly agree; slightly disagree; definitively disagree) and each item is labeled either '0' (non–ASD-like) or '1' (ASD-like) (Baron-Cohen *et al.* 2001). The questionnaire yields a score between 0 and 50 points based on the responses. The higher the score, the greater the autistic features. Kose *et al.* analyzed the validity and reliability of the AQ in the Turkish population (Kose *et al.* 2010).

The Amsterdam Misophonia Scale-Revised (AMISOS-R)

The Amsterdam Misophonia Scale-Revised Form is a self-report instrument that measures the presence and severity of symptoms in response to particular auditory stimuli (Cakiroglu *et al.* 2022). It is the revised version of the Amsterdam Misophonia Scale, which was inspired by the Yale-Brown Obsessive-Compulsive Disorder (OCD) Scale (Schröder *et al.* 2013, Jager *et al.* 2020, Naylor *et al.* 2021). It is a broader measurement instrument that evaluates the impact of misophonia on functioning, distress, efforts to resist, attempts to control voices and thoughts, and avoidance (Schröder *et al.* 2013, Jager *et al.* 2020, Naylor *et al.* 2021). After participants are asked which sounds they are sensitive to and how these sounds make them feel, a 10-item rating section is administered. Each item is rated between 0 and 4 points. The highest score to be obtained from the scale is 40 points. The severity of misophonia is classified based on the obtained score as normal and subclinical misophonia, mild misophonia, moderate and severe misophonia, or severe and extreme misophonia. Cakıroglu *et al.* analyzed the validity and reliability of the AQ in the Turkish population (Cakiroglu *et al.* 2022).

Statistical analyses

The study's data were analyzed with SPSS (Statistical Package for the Social Sciences) version 26.0. The data are expressed as a number (n), a percentage (%), a mean ± standard deviation (SD), or a frequency. Analyzing continuous variables between male/female,

smoking/non-smoking, and drinking/non-drinking groups, a two-tailed independent *t*-test was utilized. Chi-square was used to compare categorical variables. Using Pearson correlation analysis, the relationship between misophonia severity, total autism score, age, and gender was evaluated. A *p*-value of 0.05 or less was deemed statistically significant.

Results

500 participants were given scales; however, 12 declined to participate, and 43 were excluded based on the exclusion criteria (Figure 1). The study included 445 individuals between the ages of 18 and 28, including 249 females (56%) and 196 males (44%). The mean age of the women was 20.71 ± 1.86 and the mean age of the men was 20.73 ± 2.16 ($t = -0.083$; $p = 0.934$).

The participants' misophonia scores as determined by the AMISOS-R are presented in Table 1. According to these results; females were discovered to be more sensitive to misophonia than males.

Regarding the question of which sounds they are more sensitive to than other people, the participants answered the most frequent eating sounds (e.g. chewing, smacking, slurping, and swallowing) with 62%. This response is followed by 35.5% for ambient noises (clock ticking noise or similar devices). When the male and female results are examined separately, the sound of eating is the most sensitive sound in both genders. In the second place, females answered as ambient noises and repetitive clicking sounds, while males answered as ambient noises and nasal sounds (Table 2). When asked how they feel when they hear these sounds, 56.6% of participants responded as irritation. This rate is followed by anger at 49.9%.

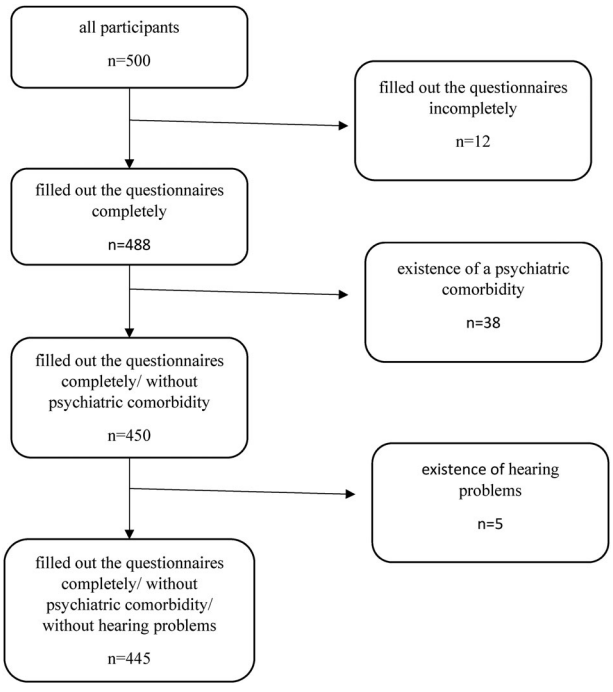

Figure 1. Participants included and excluded from the research.

Table 3 shows the relationship between the total misophonia score and whether or not a person smokes or drinks. According to the results, the total misophonia score is unaffected by conditions such as smoking and alcohol consumption (for drinking; $t = 0.469$, $p = 0.639$, and for smoking; $t = 1.377$, $p = 0.169$).

Table 4 presents and compares variables such as gender, smoking, and drinking for AQ and subscale scores. There was no statistically significant difference between the total AQ scores of males and females ($t = 0.005$; $p = 0.996$). In contrast, females had a higher AQ attention-switching score than males ($t = 2.961$; $p = 0.003$), while males had a higher AQ communication score ($t = -2.287$; $p = 0.023$). No significant differences were observed between smoking status and AQ totals ($t = -0.920$; $p = 0.358$) and subscales. The AQ social skill ($t = -2.840$; $p = 0.005$), attention switching ($t = -2.071$; $p = 0.039$), communication ($t = -2.156$; $p = 0.032$), and total AQ score ($t = -3.421$; $p = 0.001$) of drinkers were lower than that of non-drinkers.

In Table 5, the relationship between age, gender, the AMISOS-R total score, the AQ total score, and subscale scores is presented. Accordingly, as misophonia symptoms increase, autistic traits increase significantly ($r = 0.154$; $p = 0.001$). Specifically, as misophonia symptoms intensify, scores for attention switching ($r = 0.15$; $p = 0.001$), and attention to details ($r = 0.199$; $p = 0.000$) increase substantially. There is no correlation between age and the AMISOS-R ($r = -0.029$; $p = 0.273$) or AQ total scores ($r = -0.030$; $p = 0.535$), but the AQ social skill score declines with age ($r = -0.087$; $p = 0.033$). While there is no correlation between gender and AQ total score ($r = 0.000$; $p = 0.996$), we observe that females are more sensitive to misophonia ($r = -0.104$; $p = 0.014$).

Discussion

The purpose of this study was to determine whether misophonia is a symptom of ASD by examining the relationship between adult misophonia symptoms and autistic traits. Misophonia symptoms were associated with autistic characteristics, and, as predicted, autistic characteristics increased as misophonia symptoms became more severe.

Misophonia scores were found to be higher in females than in males but did not correlate with age, smoking, or alcohol consumption. Similar to our findings, Siepsiak *et al.* found that the severity of misophonia increased with females, but there was no correlation between age and misophonia severity (Siepsiak *et al.* 2020). In a study conducted in Turkey by Kılıc *et al.*, it was discovered that females, young people, and singles had higher misophonia scores (Kılıç *et al.* 2021). In contrast, Wu *et al.* found no correlation between

Table 1. Distribution of misophonia severity by gender.

	Normal and subclinical misophonia	Mild misophonia	Moderate and severe misophonia	Severe and extreme misophonia	Total
Female					
(n)	99	109	37	4	249
(% within gender)	39.8%	43.8%	14.9%	1.6%	100%
(% within severity of misophonia)	51.8%	59.2%	58.7%	57.1%	56.0%
(% of total)	22.2%	24.5%	8.3%	0.9%	56.0%
Male					
(n)	92	75	26	3	196
(% within gender)	46.9%	38.3%	13.3%	1.5%	100%
(% within severity of misophonia)	48.2%	40.8%	41.3%	42.9%	44.0%
(% of total)	20.7%	16.9%	5.8%	0.7%	44.0%
Total					
(n)	191	184	63	7	445
(% within gender)	42.9%	41.3%	14.2%	1.6%	100%
(% within severity of misophonia)	100%	100%	100%	100%	100%
(% of total)	42.9%	41.3%	14.2%	1.6%	100%

Table 2. Answer frequency of each question.

In comparison to others, I am sensitive to:		Yes (n, %)	No (n, %)
Eating sounds (e.g. chewing, smacking, slurping, swallowing)	Female	162/65.1%	87/34.9%
	Male	114/58.2%	82/41.8%
	Total	276/62%	169/38%
Nasal sounds (e.g. sniffing, breathing in, breathing out)	Female	88/35.3%	161/64.7%
	Male	51/26%	145/74%
	Total	139/31.2%	306/68.8%
Throat sounds (e.g. harrumphing, coughing)	Female	87/34.9%	162/65.1%
	Male	48/24.5%	148/75.5%
	Total	135/30.3%	310/69.7%
Specific sounds (e.g. 'K' sounds)	Female	15/6%	234/94%
	Male	13/6.6%	183/93.4%
	Total	28/6.3%	417/93.7%
Repeating clicking sounds (e.g. nails on a blackboard, pen clicking)	Female	107/43%	142/57%
	Male	50/25.5%	146/74.5%
	Total	157/35.3%	288/64.7%
Crinkling sounds (e.g. paper, plastic)	Female	51/20.5%	198/79.5%
	Male	28/14.3%	168/85.7%
	Total	79/17.8%	366/82.2%
Ambient noises (e.g. clock ticking noise or similar devices)	Female	107/43%	142/57%
	Male	51/26%	145/74%
	Total	158/35.5%	287/64.5%

Table 3. Relationship between the total misophonia score with smoking or drinking.

	Smoking ($n = 75$)	No smoking ($n = 370$)	t	p
AMISOS-R total score	13.50 + 7.50	12.19 + 7.52	1.377	0.169
	Drinking ($n = 93$)	No drinking ($n = 352$)	t	p
AMISOS-R total score	12.74 + 7.22	12.32 + 7.61	0.469	0.639

AMISOS-R: The Amsterdam Misophonia Scale-Revised.

gender, age, and the severity of misophonia (Wu *et al.* 2014). Zhou *et al.* found the severity of misophonia independent of gender (Zhou *et al.* 2017). Women may be more sensitive to anxiety than men, which may explain why the severity of misophonia was found to be greater among women in our study. This difference between age and gender demonstrates the need for additional research in this area.

The findings regarding the sounds to which participants are most sensitive are consistent with the majority of previous research (Sakarya and Çakmak 2022, Edelstein *et al.* 2013, Tunç and Başbuğ 2017, Cakiroglu *et al.* 2022). Differently, in our study, the second most sensitive sound was ambient noise, whereas in previous studies, repeating clicking sounds came in second. However, in the studies conducted by Zhou *et al.* and Wu *et al.*, repeated clicking sounds were the most sensitive, followed by sounds of eating (Wu *et al.* 2014, Zhou *et al.* 2017). This difference could be attributable to the cultural circumstances of the study groups.

As far as we are aware, no previous research has examined the connection between misophonia and drinking or smoking. It is common knowledge that individuals with certain psychiatric disorders self-medicate with alcohol and tobacco. That's why, in our study, we analyzed the consumption of cigarettes and alcohol by misophonia sufferers. However, no significant link was discovered.

Examining the autistic characteristics reveals that gender, age, and smoking have no effect on the total autism scores. The result regarding gender is particularly interesting. Previous research has shown that autistic traits are more prevalent in men than in women, and it has been hypothesized that this disparity is a result of the

Table 4. AQ total and subscale Scores by gender, smoking and drinking.

	Female ($n = 246$)	Male ($n = 196$)	*t*	*p*
AQ: social skill	3.77 ± 2.02	3.82 ± 1.93	−0.292	0.770
AQ: attention switching	5.32 ± 3.04	4.60 ± 1.69	2.961	**0.003**
AQ: attention to detail	5.50 ± 2.24	5.38 ± 2.13	0.564	0.573
AQ: communication	2.13 ± 1.77	2.54 ± 1.94	−2.287	**0.023**
AQ: imagination	3.08 ± 3.31	3.45 ± 1.64	−1.448	0.148
AQ: total	19.81 ± 6. 86	19.81 ± 6.86	0.005	0.996
	Smoking ($n = 75$)	**No smoking ($n = 370$)**	***t***	***P***
AQ: social skill	3.50 ± 2.04	3.85 ± 1.97	−1.383	0.167
AQ: attention switching	4.94 ± 5.02	5.01 ± 1.69	−0.214	0.831
AQ: attention to detail	5.37 ± 2.02	5.47 ± 2.22	−0.348	0.728
AQ: communication	1.97 ± 1.77	2.38 ± 1.87	−1.747	0.081
AQ: imagination	3.42 ± 2.10	3.21 ± 2.82	0.620	0.536
AQ: total	19.22 ± 7.86	19.93 ± 5.69	−0.920	0.358
	Drinking ($n = 93$)	**No drinking ($n = 352$)**	***t***	***P***
AQ: social skill	3.27 ± 1.78	3.93 ± 2.01	−2.840	**0.005**
AQ: attention switching	4.51 ± 1.80	5.13 ± 2.71	−2.071	**0.039**
AQ: attention to detail	5.32 ± 2.06	5.48 ± 2.22	−0.649	0.517
AQ: communication	1.94 ± 1.88	2.41 ± 1.84	−2.156	0.032
AQ: imagination	2.84 ± 1.89	3.35 ± 2.88	−1.601	0.110
AQ: total	17.91 ± 5.41	20.32 ± 6.24	−3.421	**0.001**

AQ: Autism Spectrum Quotient.

Table 5. Relationship between AMISOS-R and AQ total and subscale scores and gender and age (Pearson's correlations).

	AQ: total R(p)	AQ: social skill R(p)	AQ: attention switching R(p)	AQ: attention to detail R(p)	AQ: communication R(p)	AQ: imagination R(p)	Gender R(p)	Age R(p)
AMISOS-R total	0.154** (0.001)	0.013 (0.392)	0.155** (0.001)	0.199** (0.000)	−0.010 (0.833)	0.037 (0.442)	−0.104* (0.014)	−0.029 (0.273)
AQ: total		0.618** (0.000)	0.634** (0.000)	0.242** (0.000)	0.609** (0.000)	0.584** (0.000)	0.000 (0.996)	−0.030 (0.535)
AQ: social skill			0.265** (0.000)	−0.174** (0.000)	0.505** (0.000)	0.203** (0.000)	0.014 (0.385)	−0.087 (0.033)
AQ: attention switching				0.026 (0.584)	0.225** (0.000)	0.112* (0.018)	−0.139 (0.002)	0.030 (0.267)
AQ: attention to detail					−0.108* (0.022)	−0.087 (0.066)	−0.027 (0.287)	0.017 (0.359)
AQ: communication						0.190** (0.000)	0.108 (0.011)	−0.075 (0.058)
AQ: imagination							0.069 (0.074)	0.007 (0.443)
Gender								0.004 (0.467)

AMISOS-R: The Amsterdam Misophonia Scale-Revised.
AQ: Autism Spectrum Quotient.

differences in personality traits between the sexes (Kose *et al.* 2013, Ruzich *et al.* 2015, Murray *et al.* 2017). Studies that did not find a significant difference in gender explained this situation with a very low number of female participants (Ko *et al.* 2018, Poon *et al.* 2020). The lack of a difference in autistic characteristics between males and females in our study may be attributable to the rising prevalence of hormonal imbalances such as hirsutism, PCOS, and early menarche, which are associated with autistic characteristics. The fact that we did not obtain this information from the participants is one of the limitations of our study.

Several studies have found that autistic traits are more common in people who have problems with alcohol and other drugs (Işik *et al.* 2020, Bowri *et al.* 2021). In our study, we see that participants with alcohol use had lower autism scores. The reason for this difference is that none of our study's participants had an alcohol use disorder. Possibly, moderate alcohol consumption as a socialization tool is associated with reduced autistic traits in individuals. This idea is supported by the lower scores of drinkers on subscales such as communication and social skills.

Examining the association between the degree of misophonia and autistic traits reveals that they have a considerable impact on one another. In the study by Rinaldi *et al.*, both adults and children with misophonia were compared to healthy controls. Both adults and children in the misophonia group exhibited autistic traits that were significantly higher than those of healthy controls (Rinaldi *et al.* 2022). Simner *et al* examined attention in misophonia patients using the

AQ Attention to Detail subscale. Similarly, the attention to detail subscale score for individuals with misophonia was found to be higher than that of controls (Simner *et al.* 2021). Our study demonstrates that as misophonia symptoms increase, so do scores on the subscales of attention to detail and attention switching, corroborating previous findings.

Our study was the first to examine the correlation between the severity of misophonia and autistic symptoms. Unlike previous research, our study did not include a control group. This difference is a strong point of this study. However, this study also has several limitations. As is common knowledge, misophonia is frequently accompanied by OCD, anxiety disorders, and depression. Psychiatric symptoms of the participants included in the study were not screened with any interview method or psychometric measurement tool. We just asked them if you have any psychiatric history. We excluded comorbid psychiatric disorders without examining the association between other psychiatric disorders and misophonia severity. This is the limitation of our study. Since the autism questionnaire and the misophonia scale are actually self-report scales, they may be measuring the same symptoms. Therefore, the relationship found may not be an etiological link, but may be due to a measurement bias. This is a limitation. Another limitation is that we did not investigate hormonal imbalances (such as early menarche), which have been linked to autistic characteristics.

Controversy exists regarding whether misophonia is a distinct psychiatric disorder, a comorbid condition accompanying other psychiatric diseases, or a symptom of sensory-sensitive diseases such as ASD. However, our limitations and the fact that some of our results differ from those of previous research indicate that additional research is necessary in this area.

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Disclosure statement

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References

Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J. and Clubley, E. 2001. The autism-spectrum quotient (AQ): Evidence from Asperger syndrome/high-functioning autism, malesand females, scientists and mathematicians. *Journal of Autism and Developmental Disorders*, 31, 5–17.

Bernstein, R., Angell, K. and Dehle, C. D. 2013. A brief course of cognitive behavioural therapy for the treatment of misophonia: A case example. *Cognitive Behavioral Therapy*, 42, e10.

Bowri, M., Hull, L., Allison, C., Smith, P., Baron-Cohen, S., Lai, M. C. and Mandy, W. 2021. Demographic and psychological predictors of alcohol use and misuse in autistic adults. *Autism: The International Journal of Research and Practice*, 25, 1469–1480.

Boyce, P. M. 2015. A young woman with noise intolerance. *Medicine Today*, 16, 46–47.

Cakiroglu, S., Cosgun, S. and Gormez, V. 2022. The prevalence and severity of misophonia in the Turkish population and validation of the Amsterdam Misophonia Scale-Revised. *Bulletin of the Menninger Clinic*, 86, 159–180.

Cusack, S. E., Cash, T. v. and Vrana, S. R. 2018. An examination of the relationship between misophonia, anxiety sensitivity, and obsessive-compulsive symptoms. *Journal of Obsessive-Compulsive and Related Disorders*, 18, 67–72.

Dozier, T. H. 2015. Etiology, composition, development and maintenance of misophonia: A conditioned aversive reflex disorder. *Psychological Thought*, 8, 114–129.

Edelstein, M., Brang, D., Rouw, R. and Ramachandran, V. S. 2013. Misophonia: Physiological investigations and case descriptions. *Frontiers in Human Neuroscience*, 7, 296.

Eijsker, N., Schröder, A., Smit, D. J. A., van Wingen, G. and Denys, D. 2019. Neural basis of response bias on the stop signal task in misophonia. *Frontiers in Psychiatry*, 10, 765.

Erfanian, M., Kartsonaki, C. and Keshavarz, A. 2019. Misophonia and comorbid psychiatric symptoms: A preliminary study of clinical findings. *Nordic Journal of Psychiatry*, 73, 219–228.

Greenaway, R. and Howlin, P. 2010. Dysfunctional attitudes and perfectionism and their relationship to anxious and depressive symptoms in boys with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 40, 1179–1187.

Işik, Ü., Çokünlü, Y., Şimşek, F., Demirel, B., Kiliç, F., Demirdaş, A. and Eren, İ. 2020. Autistic traits in men with substance use disorder. *The Journal of Nervous and Mental Disease*, 208, 505–509.

Jager, I., de Koning, P., Bost, T., Denys, D. and Vulink, N. 2020. Misophonia: Phenomenology, comorbidity and demographics in a large sample. *PLoS One*, 15, e0231390.

Jastreboff, M. M. and Jastreboff, P. J. 2001. Components of decreased sound tolerance: Hyperacusis, misophonia, phonophobia. *ITHS News Letter*, 2, 5–7.

Jastreboff, P. J. and Jastreboff, M. M. 2014. Treatments for decreased sound tolerance (hyperacusis and misophonia). *Seminars in Hearing*, 35, 105–120.

Kılıç, C., Öz, G., Avanoğlu, K. B. and Aksoy, S. 2021. The prevalence and characteristics of misophonia in Ankara, Turkey: Population-based study. *BJPsych Open*, 7, e144.

Ko, H. Y., Lee, W. H., Won, E. K., Ban, J. J., Jung, D. E. and Kim, Y. 2018. The reliability and validity of the Korean version of the autism-spectrum quotient. *Psychiatry Investigation*, 15, 783–789.

Kose, S., Bora, İ., Erermiş, S. and Aydin, C. 2010. Psychometric features of Turkish version of autism-spectrum quotient. *Anadolu Psikiyatri Dergisi-Anatolian Journal of Psychiatry*, 11, 253–260.

Kose, S., Bora, E., Erermiş, S., Özbaran, B., Bildik, T. and Aydin, C. 2013. Broader autistic phenotype in parents of children with autism: Autism Spectrum Quotient–Turkish version. *Psychiatry and Clinical Neurosciences*, 67, 20–27.

Kumar, S., Hancock, O., Cope, T., Sedley, W., Winston, J. and Griffiths, T. D. 2014. Misophonia: A disorder of emotion processing of sounds. *Journal of Neurology, Neurosurgery & Psychiatry*, 85, e3–e3.

Martino, D. and Hedderly, T. 2019. Tics and stereotypies: A comparative clinical review. *Parkinsonism & Related Disorders*, 59, 117–124.

McKay, D., Kim, S.-K., Mancusi, L., Storch, E. A. and Spankovich, C. 2018. Profile analysis of psychological symptoms associated with misophonia: A community sample. *Behavior Therapy*, 49, 286–294.

Meier, S. M., Petersen, L., Schendel, D. E., Mattheisen, M., Mortensen, P. B. and Mors, O. 2015. Obsessive-compulsive disorder and autism spectrum disorders: Longitudinal and offspring risk. *PLoS One*, 10, e0141703.

Murray, A. L., McKenzie, K., Kuenssberg, R. and Booth, T. 2017. Do the autism spectrum quotient (AQ) and autism spectrum quotient short form (AQ-S) primarily reflect general ASD traits or specific ASD traits? A bi-factor analysis. *Assessment*, 24, 444–457.

Naylor, J., Caimino, C., Scutt, P., Hoare, D. J. and Baguley, D. M. 2021. The prevalence and severity of misophonia in a UK undergraduate medical student population and validation of the Amsterdam misophonia scale. *Psychiatric Quarterly*, 92, 609–619.

Norris, J. E., Kimball, S. H., Nemri, D. C. and Ethridge, L. E. 2022. Towards a multidimensional understanding of misophonia using cluster-based phenotyping. *Frontiers in Neuroscience*, 16, 832516.

Poon, V. W. K., Shu, D. S. T., Chan, R. W. S., Leung, C. N. W. and Leung, P. W. L. 2020. Comparing the psychometric properties of the self- and parent-report versions of autism-spectrum quotient-adult in Hong Kong (AQ-adult-HK). *Journal of Autism and Developmental Disorders*, 50, 524–528.

Rinaldi, L. J., Simner, J., Koursarou, S. and Ward, J. 2022. Autistic traits, emotion regulation, and sensory sensitivities in children and adults with Misophonia. *Journal of Autism and Developmental Disorders*, 1–13. doi: 10.1007/s10803-022-05623-x

Robertson, A. E. and Simmons, D. R. 2013. The relationship between sensory sensitivity and autistic traits in the general population. *Journal of Autism and Developmental Disorders*, 43, 775–784.

Ruzich, E., Allison, C., Smith, P., Watson, P., Auyeung, B., Ring, H. and Baron-Cohen, S. 2015. Measuring autistic traits in the general population: A systematic review of the Autism-Spectrum Quotient (AQ) in a nonclinical population sample of 6,900 typical adult males and females. *Molecular Autism*, 6, 2.

Sakarya, M. D. and Çakmak, E. 2022. Mizofoni Ölçeği'nin Türkçe Formunun Geçerlik ve Güvenirlik Sınama Çalışması. *Psikoloji Çalışmaları/Studies in Psychology*, 42, 231–255.

Sanchez, T. G. and Silva, F. E. D. 2018. Familial misophonia or selective sound sensitivity syndrome: Evidence for autosomal dominant inheritance? *Brazilian Journal of Otorhinolaryngology*, 84, 553–559.

Schneider, R. L. and 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. and Denys, D. 2013. Misophonia: Diagnostic criteria for a new psychiatric disorder. *PLoS One*, 8, e54706.

Siepsiak, M., Sobczak, A. M., Bohaterewicz, B., Cichocki, Ł. and Dragan, W. Ł. 2020. Prevalence of misophonia and correlates of its symptoms among inpatients with depression. *International Journal of Environmental Research and Public Health*, 17, 5464.

Simner, J., Koursarou, S., Rinaldi, L. J. and Ward, J. 2021. Attention, flexibility, and imagery in misophonia: Does attention exacerbate everyday disliking of sound? *Journal of Clinical and Experimental Neuropsychology*, 43, 1006–1017.

Tavassoli, T., Hoekstra, R. A. and Baron-Cohen, S. 2014. The Sensory Perception Quotient (SPQ): Development and validation of a new sensory questionnaire for adults with and without autism. *Molecular Autism*, 5, 29–10.

Tunç, S. and Başbuğ, H. S. 2017. An extreme physical reaction in misophonia: Stop smacking your mouth!. *Psychiatry and Clinical Psychopharmacology*, 27, 416–418.

Williams, Z. J., Cascio, C. J. and Woynaroski, T. G. 2022. Psychometric validation of a brief self-report measure of misophonia symptoms and impairment: The duke-vanderbilt misophonia screening questionnaire. *Frontiers in Psychology*, 13, 897901.

Wu, M. S., Lewin, A. B., Murphy, T. K. and Storch, E. A. 2014. Misophonia: Incidence, phenomenology, and clinical correlates in an undergraduate student sample. *Journal of Clinical Psychology*, 70, 994–1007.

Zhou, X., Wu, M. S. and Storch, E. A. 2017. Misophonia symptoms among Chinese university students: Incidence, associated impairment, and clinical correlates. *Journal of Obsessive-Compulsive and Related Disorders*, 14, 7–12.