ORIGINAL ARTICLE

PCN Reports
Psychiatry and Clinical Neurosciences
Open Access

Misophonia, self-harm and suicidal ideation

Julia Simner PhD | **Louisa J. Rinaldi PhD** (ORCID)

School of Psychology, University of Sussex, Brighton, UK

Correspondence
Julia Simner, PhD, School of Psychology, University of Sussex, Pevensey Bldg, Brighton BN1 9RQ, UK.
Email: J.Simner@sussex.ac.uk

Abstract

Aim: Misophonia is a sound sensitivity disorder characterized by an unusually strong aversion to a specific class of sounds—often human bodily sounds (e.g., chewing). These sounds can cause intense negative emotions which can cause profound difficulties in everyday life. The condition is linked with higher rates of anxiety and depression, and here we ask whether it co-occurs with elevated self-harm and suicidal thinking.

Methods: We measured self-harm and misophonia in the general population by examining a birth cohort sample from the Avon Longitudinal Study of Parents and Children (ALSPAC). We screened them for misophonia as adults, then analyzed their earlier data on well-being, self-harm, and suicidal thinking.

Results: Adults with misophonia had significantly higher rates of self-harm and suicidal ideation, as well as poorer well-being in a number of different measures at ages 16–17 and 23–24 years. Female misophonics were particularly at risk, from as early as their teenage years, though males, too, show elevated self-harm at 24 years compared to nonmisophonic peers.

Conclusion: Our data provide evidence of elevated risks of self-harm associated with misophonia and suggest the need for greater recognition and treatment pathways.

KEYWORDS
Avon Longitudinal Study of Parents and Children (ALSPAC), mental health, misophonia, self-harm, suicidal ideation, suicide

Misophonia is a sound sensitivity disorder in which certain classes of sound feel unusually unpleasant.[1,2] Typical triggers are human bodily sounds (e.g., chewing), repetitive sounds (e.g., clicking), or even nonauditory repetitive actions, such as leg-rocking,[3–6] despite its primary classification as a sound sensitivity. For people with misophonia, these triggers can cause intense negative emotions, such as anxiety, disgust, or anger.[2] Although recognized by many as a psychiatric disorder in its own right,[7] misophonia has also been linked to other mental health challenges (e.g., depression), including self-harm (see below). However, these links have sometimes been based on participant samples which are self-selected or more extreme cases (e.g., drawn from clinics). Here we examine misophonia in the wider population using a large birth cohort. We investigate well-being in the

context of self-harm and suicidal ideation, asking whether the general population of misophonia sufferers is more at risk than nonmisophonics in this regard.

Self-harm is a key public health concern[8] with a lifetime European prevalence of 17.1% at 17 years.[9] Self-harm comes with an elevated risk of suicide,[10] as well as suicidal thoughts and planning.[8] Relevant here is that self-harm is five times higher among depressed individuals[8] and, importantly, people with misophonia have higher depressive traits[11,12] and anxiety[13–15] as well as poorer well-being.[14] As such, there may be a link between misophonia, depression, self-harm, and suicidal ideation, which we explore here. Our investigation also reflects that self-harm has been divided into distinct classes: self-harm with intent to die (attempted suicide), and

self-harm without suicidal intent (sometimes called nonsuicidal self-injury),[16,17] though these may yet be different intensities of the same phenomenon.[8,18] A related phenomenon is suicidal thinking (prevalent at 11%–17%) or planning (9.5%).[19,20] Importantly, those who self-harm with no intent for suicide still have an elevated risk of attempted suicide[17] and suicidal thoughts.[21] Hence our investigation not only targets self-harm (with and without intent to die) but suicidal thinking.

Case studies have described self-harm and suicidal ideation/planning in misophonics with co-morbidities such as anxiety.[22–25] However, participants have often been drawn from clinics, where the most severe cases are likely to gather. Moreover, case studies cannot provide a meaningful link to misophonia because they may be a chance co-occurrence which drew the attention of clinicians/researchers. Groupwise studies have provided a useful continuation but have presented a mixed picture. Two had no controls but showed suicidality in approximately the normal range for the general population (Edelstein et al.[26] = 9.1%; Rouw and Erfanian[27] = 21.9%; See[28,29]), while a third[30] did not provide analyses for self-harm/suicidality alone (but merged it among 16 different psychiatric disorders). A fourth study targeted a random cohort in Ankara using a battery of questions including a single question on attempted suicide.[31] Suicide attempts were reported significantly more often in those with misophonia, but the study was unable to achieve its random recruitment goal because a large portion (one-third[*]) of their target population declined to take part or were rejected. However, this study makes the important first step towards random sampling and suggests that suicide rates may potentially be higher in misophonia.

Our own investigation targets a large birth cohort of adults who have been tested extensively since infancy, including measures of well-being and mental health (Avon Longitudinal Study of Parents and Children [ALSPAC]).[32] We screened them at 28 years, identifying several hundred participants with misophonia, and several thousand without. Then, using data gathered earlier from the same cohort, we ask whether the misophonia group diverged from their peers in self-harm, suicidal ideation, and well-being in this earlier data. Our interest in well-being is to explore the types of prerequisites that might make self-harm likely to manifest. We know that quality of life declines with increasing misophonia symptoms, and misophonics have poorer life satisfaction as adults[4] and children.[14] But subjective well-being is a heterogenous construct, including not only evaluative life satisfaction[33] but also hedonic well-being (e.g., emotional stability), eudemonic well-being (e.g., positive attitude),[34] and health-related quality of life.[35,36] People with misophonia show significant deficits in the former and latter, but other well-being constructs in misophonia are less well understood. Here we analyze data from scales of mental well-being, subjective happiness, personal well-being, and life satisfaction (this latter to replicate earlier findings and establish additional validity).

In summary, we hypothesize higher rates of self-harm (with or without intent to die) in our sample of people with misophonia,

accompanied by poorer well-being. These hypotheses are based on higher rates of depression/anxiety found in previous misophonia studies and lower life satisfaction.

METHODS

Participants

We tested the ALSPAC birth cohort[32,37,38] whose original recruits were pregnant women from Avon, UK, with expected delivery dates between April 1, 1991 and December 31, 1992. Initial enrolment resulted in 14,901 babies alive at 1 year of age. In the current study we screened over 4000 of the active remaining respondents (called the *Children of the 90s cohort*) in December 2020–February 2021 as part of the "Life at 28+" wave of data collection. Our returned data were from 4253 adults, comprising 1452 males-at-birth (mean age 345.81 months; SD 5.94 months), 2798 females-at-birth (mean age 345.49 months; SD 6.04 months) and three without sex-at-birth data (mean age 338.67 months; SD 4.51 months). After our screening for misophonia (see Materials), this group contained 333 adults with misophonia (77 male, 256 female) and 3920 without (1375 male, 2542 female, 3 unknown) who form our nonmisophonic comparison group. Table 1 shows how many participants also had data for our earlier measures of interest.

MATERIALS

Table 2 summarizes which measures were administered at each period of interest (16–17, 23–24, 28 years).

Sussex Screener for Misophonia[11]

The Sussex Screener for Misophonia (SSfM) was administered at 28 years of age, and provides a characterization of misophonia to which participants agree or disagree (i.e., *When sounds (e.g., crunching) consistently cause extreme emotions, like anger, disgust or anxiety*), as well as examples of major categories of misophonia triggers (*eating noises, throat clearing, nasal noises*, etc.). For those agreeing with misophonia, the screener contains further items probing its severity in disrupting daily life (*not at all, very mildly, moderately, severely, very severely*), and additional questions (for consideration elsewhere), such as whether the participant had sought clinical support, and when they believe it had developed. Misophonics are classified as those agreeing with the characterization of misophonia, but also rejecting "not at all" for its detriment to daily life (i.e., misophonia must disrupt daily life for participants in our misophonia group, at least to some degree). The remainder formed our comparison group (i.e., disagreeing to misophonia, or saying they dislike sounds but not to any detriment in their daily life).

The screener shows ample convergent and divergent validity from multiple lines of evidence from the participants' lives, described fully in Rinaldi and Simner.[11] For example, those identified with

---

*We deduce these researchers targeted approximately 822 participants in 300 households because the average household size of eligible participants was 2.74 (given their report of 710 eligible residents living in a subset of 259 houses). Of these 822 targeted, 541 took part.

TABLE 1 Participant numbers for our misophonic and nonmisophonic comparison group, with a breakdown by sex-at-birth (female, male) with mean age (and standard deviation) in months.

Group	Timepoint (approximate age in years)	Total N	N Female	N Male	Mean age in months (SD)
Total	16	2948	1974	974	200.01 (2.78)
Misophonics	16	227	183	44	199.89 (2.73)
Nonmisophonics	16	2721	1791	930	200.01 (2.78)
Total	17	2634	1737	897	-Missing-
Misophonics	17	195	154	41	-Missing-
Nonmisophonics	17	2439	1583	856	-Missing-
Total	23	2987	2061	926	286.32 (6.22)
Misophonics	23	221	181	40	285.97 (6.26)
Nonmisophonics	23	2729	1853	876	286.34 (6.22)
Total	24	3125	2129	996	298.40 (6.25)
Misophonics	24	233	186	47	297.85 (6.09)
Nonmisophonics	24	2892	1943	949	298.43 (6.26)

Note: Mean age was not accessible to us at 17 years due to a technical error, but see age at 16 years.

TABLE 2 Measures administered at each time period and age.

Period (years)	Questionnaire on self-harm and suicidal feeling (years)	Well-being measures	Misophonia measure
16–17	16	17 years: WEMWBS	–
23–24	24	23 years: WEMWBS; SHS; SWLS; ONS4	–
28	–	–	SSfM

Abbreviations: ONS4, Office for National Statistics 4-Item Scale; SHS, Self-Harm Scale; SSfM, Sussex Screener for Misophonia; SWLS, Satisfaction with Life Scale; WEMWBS, Warwick-Edinburgh Mental Well-Being Scale.

misophonia as adults were twice as likely than the comparison group to report a sound sensitivity at an audiology clinic at 11 years,[39] and were significantly more likely to avoid eating near others at both 13 and 25 years (remembering the most common misophonia triggers are other people's eating sounds). Similarly, they were significantly more likely than the comparison group to use sound-distractions while eating (e.g., tv), and showed typical interpersonal difficulties aged 25 (e.g., more annoyed by others). Finally, the screener has divergent validity, being nonpredictive of unrelated traits (e.g., creative self-concept).[11] Participants completed the screener in digital form, with a pencil-and-paper version on request. These data (and those that follow) were gathered by the ALSPAC team using Redcap, the secure web-based software platform hosted at the University of Bristol to support data capture for research studies.[40]

Questionnaire on self-harm and suicidal feeling[8]

This self-complete questionnaire measured self-harm (with and without intent to die) as well as suicidal thinking and planning. It was administered at 16 and 24 years, the latter in abridged form.

The questionnaire has no total score but comprises individual questions of relevance, with certain questions contingent on previous answers. For our purposes here, participants at age 16 were asked "Have you **ever** hurt yourself on purpose **in any way** (e.g., by taking an overdose of pills or by cutting yourself)?" Responses were *yes/no*, and affirmative responders were subsequently asked: "On **any** of the occasions when you have hurt yourself on purpose, have you ever seriously wanted to kill yourself?" (*yes/no*). Finally, the entire sample was given a question drawn from a study of suicidal feeling,[41] this being: "Have you **ever** felt that life was not worth living?" (*yes/no*). In the abridged version at age 24, participants were again asked the first two questions above, as well as a suicidal thinking question, phrased as follows: "Have you **ever** thought of killing yourself, even if you would not really do it?" (*yes/no*).[†]

[†]Additional questions were not explored further, either because we had no a priori hypotheses (e.g., about methods of self-harm), or because questions were deeply embedded (required multiple "yes" responses at different earlier questions). All questions are found at Kidger et al.,[8] and ALSPAC's searchable data dictionary (http://www.bristol.kiac.uk/alspac/researchers/our-data).

Multiple studies show convergent validity between these items and a number of biological and psychological traits. For example, the self-harm items show the known inverse correlation with puberty indicators, such as age of menarche[42] and peak height velocity,[43] while suicidality items show known correlations with birth order[44] and maternal depression.[45]

The Warwick-Edinburgh Mental Well-Being Scale[46]

This 14-item scale measured hedonic and eudemonic well-being at 17 and 23 years. Questions cover mental well-being over the past 2 weeks (e.g., "I've been feeling optimistic about the future") with responses on a five-point scale (*none of the time* to *all of the time*). Responses are summed for a total score (14–70), where higher scores indicate better mental well-being.

The measure shows high internal consistency and moderate to high test–retest reliability in 13–16-year-olds,[47] university students, and the general population aged 16–75 years.[46] In the same studies it also showed convergent validity with measures of life satisfaction as well as divergent validity with opposing constructs (e.g., physical health) and concurrent validity with the World Health Organization-Five Well-Being Index.[48]

The UK Office of National Statistics four subjective well-being questions[49]

The Office for National Statistics 4-Item Scale (ONS4) was administered at 23 years, and comprises four questions about three types of well-being (evaluative, eudemonic, affective): *Overall, how satisfied are you with your life nowadays? Overall, to what extent do you feel that the things you do in your life are worthwhile? Overall, how happy did you feel yesterday? How anxious did you feel yesterday?* Responses run from 1 to 10 (*not at all* to *completely*). This measure is designated for National Statistics (i.e., deemed to meet high standards of trustworthiness and value)[49,50] and used extensively by the ONS and UK Government (citations at www.tinyurl.com/ons4surveys). For example, one recent validation[51] showed good internal reliability (Cronbach's $\alpha = 0.90$), and moderate/strong correlations with health confidence and health status.

Subjective Happiness Scale[52]

This four-item scale of hedonic well-being in subjective happiness was administered at 23 years. Responses have a seven-point scale with labels adjusted by question. Its four questions are: *In general, I consider myself… not a very happy person → a very happy person; Compared with most of my peers, I consider myself… less happy → more happy; Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of*

everything. To what extent does this characterization describe you? Not at all → A great deal; Some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterization describe you? Not at all → A great deal.* The scale has been translated into more than 30 languages and validated extensively with a unidimensional structure and adequate test–retest reliability and internal consistency, as well as convergent validity against related constructs such as depression.[52,53]

Satisfaction with Life Scale[54]

This self-report for life satisfaction was administered at 23 years, and has responses on a five-point Likert scale (*disagree a lot* to *agree a lot*). Its five items are: *In most ways my life is close to the way I would want it to be; The things in my life are excellent; I am happy with my life; So far I have gotten the important things I want in life; If I could live my life over, I would have it the same way.* The Satisfaction with Life Scale (SWLS) is one of the most widely used well-being scales across a range of different age groups, genders, and nationalities.[55] Multiple validations show it to be a reliable measure of life satisfaction, with good convergent validity, and satisfactory-to-high reliability and internal consistency (e.g., $\alpha = 0.74$).[55–58]

ANALYTIC PLAN

Since our sample is female skewed and there are known associations between sex and well-being/self-harm (where girls are especially affected),[59] we examine males and females separately (i.e., either as separate datasets for χ^2s or as a predictor in analyses of variance [ANOVAs]). Given this, we also removed the three participants whose sex-at-birth was unknown.

We used χ^2 analyses (with Yates corrections where required) for the categorical self-harm data at each timepoint. For well-being in late adolescence (Warwick-Edinburgh Mental Well-Being Scale [WEMWBS at age 17), we report a 2 × 2 ANOVA crossing group (misophonics, nonmisophonics) and sex-at-birth (females, males) having removed outliers ($n = 17$ with z-scores >3), and meeting assumptions of normality, linearity, and homogeneity of variance (using Levene's test).[60] We additionally report a binary logistic regression for the link between well-being and self-harm, selecting the earliest time point (16–17 years) and longest well-being measure (WEMWBS).

At age 23, we report a 2 × 2 multivariate analysis of variance (MANOVA) crossing group (misophonics, nonmisophonics) and sex-at-birth (females, males) predicting our four well-being measures (subjective happiness, life satisfaction, WEMWBS, ONS4). We removed excessive missing data (of >5%), and multivariate outliers (using Mahalanobis distance) totalling 198 participants ($n = 175$ for missingness, $n = 23$ outliers). Data were approximately multivariate

normal, and met linearity and homogeneity of covariance (Box's M).[61] We also conducted univariate ANOVAs (correcting post-hoc tests) for each outcome. We used R/R Studio[62] with the following packages: tidyverse for general data wrangling, ggplot2 and gridExtra for graphs, ez for univariate ANOVA, car for Levene's test, and heplots for Box's M.

We remind the reader that we split our participants into "misophonics" and "nonmisophonics" only once, using the screener at 28 years. Hence when we describe "data from our misophonia group at age 16" (or "misophonic participants at age 16"), this means data from 16-year-old individuals who went on to demonstrate misophonia when screened at 28 years. Sample size for each analysis is shown in Table 1 (given that sample size changed according to participant availability across the three decades of this longitudinal data).

RESULTS

Time block 16–17 years

Self-harm age 16

We first inspected the proportion of misophonics and nonmisophonics who had ever self-harmed. χ^2s were performed separately for females and males. Males showed no difference for misophonics versus nonmisophonics (χ^2 (1) = 0.12, p = 0.723) but females showed a significantly higher percentage of misophonics self-harming compared to nonmisophonics (χ^2 (1) = 20.98, p < 0.001; see Table 3). Within yes-responders we next looked at whether their self-harm was with intent to die ("…seriously wanted to kill yourself?"). We found no significant groupwise difference for either females (χ^2 (1) = 1.64, p = 0.200) or males (χ^2 (1) = 0.03, p = 0.852; see Table 4). However, this embedded question means numbers were small, especially for males.

Finally, we examined suicidal feelings with the question targeting the entire sample ("…felt that life was not worth living?"). We again

TABLE 3 Frequency of responses at age 16 for whether participant has self-harmed ("Have you ever hurt yourself on purpose in any way…").

Question Response by Gender	Misophonic N	Nonmisophonic N
Females		
Yes self-harmed	71 (39%)	414 (23%)
No didn't self-harm	112	1372
Males	Misophonic N	Nonmisophonic N
Yes self-harmed	5 (12%)	82 (9%)
No didn't self-harm	38	844

Note: Counts are shown for each group (misophonic vs. nonmisophonic) separately by sex-at-birth, with percentages in brackets for those who replied in the affirmative.

TABLE 4 Frequency of responses at age 16 for whether participant has self-harmed ("On any of the occasions when you have hurt yourself on purpose, have you ever seriously wanted to kill yourself?").

Question Response by Gender	Misophonic N	Nonmisophonic N
Females		
Yes wanted to	27 (38%)	122 (30%)
No didn't want to	44	290
Males	Misophonic N	Nonmisophonic N
Yes wanted to	≤5 (40%)	21 (26%)
No didn't want to	≤5	61

Note: Counts are shown for each group (misophonics vs. nonmisophonics) separately by sex-at-birth, with percentages in brackets for those who replied in the affirmative. Cells with ≤5 are shown as such, and may contain 0.

TABLE 5 Frequency of responses at age 16 for whether participant has had suicidal feelings ("*Have you ever felt that life was not worth living?*").

Question Response by Gender	Misophonic N	Nonmisophonic N
Females		
Yes	87 (48%)	522 (29%)
No	95	1259
Males	Misophonic N	Nonmisophonic N
Yes	12 (28%)	148 (17%)
No	31	722

found no groupwise differences among males (χ^2 (1) = 2.65, p = 0.103), but a significant difference among females (χ^2 (1) = 25.53, p < 0.001; see Table 5) such that misophonics experienced suicidal feeling more than nonmisophonics.

Well-being age 17

Our 2 × 2 ANOVA crossed group (misophonic, nonmisophonic) and sex-at-birth (female, male) in the WEMWBS well-being scale. We found a significant main effect of group (F[1, 2613] = 6.65, p = .009, ηp^2 = 0.003), where misophonics scored lower (M = 46.13, SD = 9.35) than nonmisophonics (M = 48.33, SD = 8.24). We also found an expected main effect of sex-at-birth (F[1, 2613] = 11.14, p < 0.001, ηp^2 = 0.004) where females scored lower (M = 47.22, SD = 8.43) than males (M = 49.97, SD = 7.96), but there was no significant interaction between group and sex-at-birth (F[1, 2613] = 0.08, p = 0.775, ηp^2 < 0.001; Figure 1). Finally, we performed a binary logistic regression to confirm the expected negative link between well-being and self-harm (p < 0.001). This showed that for every 1 unit increase in WEMWBS there was a 0.06 decrease in log odds of self-harming.
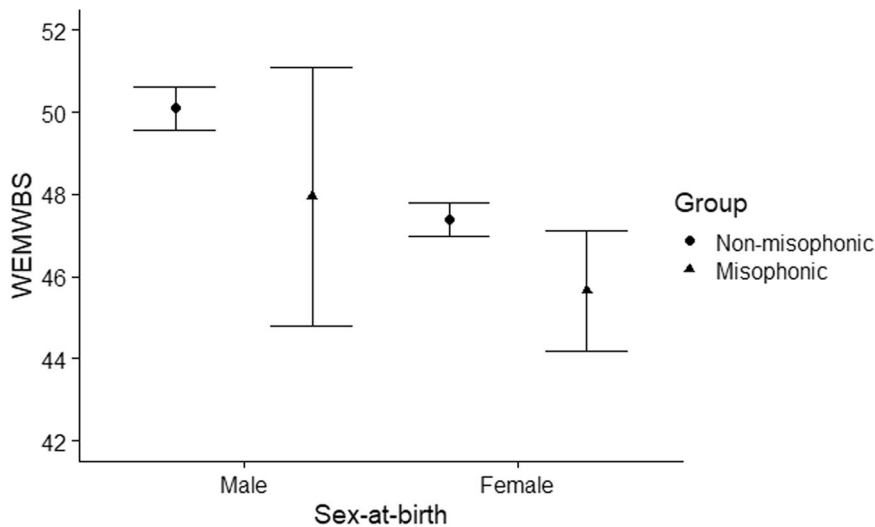
FIGURE 1 Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) scores and 95% confidence intervals (CIs) at age 17 by group (misophonics, nonmisophonics) and sex-at-birth (male, female). Groupwise comparisons are significant for both males and females.

TABLE 6 Frequency of responses at age 24 for whether participant has self-harmed ("*Have you ever hurt yourself on purpose in any way*").

Question Response by Gender	Misophonic N	Nonmisophonic N
Females		
Yes self-harmed	88 (47%)	514 (26%)
No didn't self-harm	98	1437
Males	Misophonic N	Nonmisophonic N
Yes self-harmed	12 (27%)	135 (14%)
No didn't self-harm	33	812

Note: Counts are shown for each group (misophonics vs. nonmisophonics) separately by sex-at-birth, with percentages in brackets for those who replied in the affirmative.

TABLE 7 Frequency of responses at age 24 for whether participant has self-harmed ("On any of the occasions you hurt yourself on purpose, have ever you seriously wanted to kill yourself?").

Question Response by Gender	Misophonic N	Nonmisophonic N
Females		
Yes wanted to kill self	39 (44%)	152 (30%)
No didn't want to kill self	49	362
Males	Misophonic N	Nonmisophonic N
Yes wanted to kill self	≤5 (9%)	39 (29%)
No didn't want to kill self	11	96

Note: Cells with ≤5 are shown as such, and may contain 0. Counts are shown for each group (misophonics vs. nonmisophonics) separately by sex-at-birth, with percentages in brackets for those who replied in the affirmative.

Time block 23–24 years

Self-harm age 24

We began at 24 years by looking at the same two initial questions probed at age 16. For the first question ("… hurt yourself on purpose…?") we found a significant groupwise difference among males (χ^2 (1) = 4.31, p = 0.038) and also among females (χ^2 (1) = 35.86, p < 0.001). In both cases, misophonics were significantly more likely to self-harm compared to nonmisophonics (Table 6).

We next looked at the same embedded question asked at 16 years, related to self-harm with the intention to die ("… have ever you seriously wanted to kill yourself?"). Numbers were again small, and there were no groupwise differences among males (χ^2 (1) = 1.43, p = 0.232) but we found a significant effect for females (χ^2 (1) = 6.88, p = 0.009) where female misophonics self-harmed with intent to die more often than nonmisophonics (Table 7).

Finally we looked at the question about suicidal ideation asked of the entire samples at 24 years ("Have you ever thought of killing yourself, even if you would not really do it?"). Although there was no groupwise difference among males (χ^2 (1) = 1.42, p = 0.234) we found

a significant difference in females (χ^2 (1) = 48.82, p < 0.001) such that misophonics had suicidal ideation more often than nonmisophonics (see Table 8).

Well-being age 23

Our between-groups MANOVA crossed group (misophonic, non-misophonic) and sex-at-birth (female, male) predicting four well-being measures (Subjective Happiness Scale [SHS]/subjective happiness; SWLF/life satisfaction; WEMWBS well-being; ONS4 well-being; Figure 2). Significant multivariate effects were found for group (F[4, 2837] = 4.99, p < .001, ηp^2 = 0.007) and sex-at-birth (F[4, 2837] = 4.93, p < 0.001, ηp^2 = 0.007), and for the interaction between group and sex-at-birth (F[4, 2837] = 2.61, p = 0.034, ηp^2 = 0.004).

Subsequent univariate ANOVAs showed that misophonics had significantly poorer well-being than nonmisophonics in all four well-being measures, first in subjective happiness scores (F[1, 2840] = 17.70 p < 0.001, ηp^2 = 0.006) where their mean was M = 17.87 (SD = 5.71) compared to nonmisophonics (M = 19.78 SD = 5.01). Life satisfaction

showed the same main effect of group (F[1, 2840] = 5.03 p = 0.028, ηp^2 = 0.002) where misophonics (M = 21.98, SD = 6.86) again reported lower satisfaction than nonmisophonics (M = 24.11, SD = 6.54). Similarly, misophonics had lower well-being in the WEMWBS (M = 45.80, SD = 9.77) compared to nonmisophonics (M = 49.38, SD = 8.77; F[1, 2840] = 11.64 p < 0.001, ηp^2 = .004). And finally, they also had lower well-being (M = 23.25, SD = 5.51) than nonmisophonics (M = 24.63, SD = 4.96) on the ONS4 (F[1, 2840] = 7.94 p = 0.004, ηp^2 = 0.003).

There was no main effect of sex-at-birth for subjective happiness (F[1, 2840] = 0.91, p = 0.339, ηp^2 = <0.001), nor in satisfaction with life (F[1, 2840] = 0.17 p = 0.682, ηp^2 = <0.001), nor in the ONS4 (F[1, 2840] = 0.93 p = 0.336, ηp^2 = <0.001). However females scored lower in their WEMWBS (F[1, 2840] = 4.06 p = 0.044, ηp^2 = 0.001) with a mean of 48.76 (SD = 8.84) compared to males who scored M = 49.91 (SD = 8.98).

There were no (group × sex-at-birth) interaction effects for three of our four well-being measures: subjective happiness (F[1, 2840] = 0.10, p = 0.757, ηp^2 = <0.001), WEMWBS (F[1, 2840] = 0.93 p = 0.334, ηp^2 = <0.001), or ONS4 (F[1, 2840] = 0.02 p = 0.881, ηp^2 = <0.001). However, there was a significant interaction for Life

TABLE 8 Frequency of responses for question ("Have you ever thought of killing yourself, even if you would not really do it?") at the age of 24 for each group (misophonics vs. nonmisophonics) shown separately by sex-at-birth.

Question Response by Gender	Misophonic N	Nonmisophonic N
Females		
Yes thought of killing self	113 (60%)	669 (34%)
No didn't think of killing self	74	1278
Males	Misophonic N	Nonmisophonic N
Yes thought of killing self	19 (42%)	308 (33%)
No didn't think of killing self	26	639

Note: Percentages are shown in brackets for those who replied in the affirmative.

Satisfaction (F[1, 2840] = 3.95 p = 0.047, ηp^2 = 0.001), since misophonics had lower life-satisfaction in the female group (p < 0.001, which survives the corrected α) but not the male group (p = 0.710) using the Bonferroni test. This is illustrated in Figure 2 (bottom-right).

DISCUSSION

Our study examined adult participants from a large birth cohort who were screened at 28 years for misophonia, and then examined retrospectively on measures they had already completed at 16–17 and 23–24 years. We found that female misophonics aged 16–17 years were more likely to have suicidal thinking than nonmisophonics (i.e., that life was not worth living), and were self-harming more— although at this age they did not show more tendency to self-harm *with intent to die*. Nonetheless, by the age of 24 years, female misophonics were again thinking more about suicide, and self-harming more than their nonmisophonic peers, but additionally, they were now also more likely to self-harm with a serious intent to die (i.e., more so than nonmisophonics). They were also now joined by male misophonics in self-harming more than their nonmisophonic peers at 24 years. Our study therefore provides support for previous assumptions of self-harm in case studies[22,24,25] or as descriptive statistics,[30] or in early random-sampling methods.[31]

Given these higher risks in the misophonia group, we also found poorer well-being across multiple measures and time-points (WEMWBS at age 17, and the same at 23 in addition to the SWLS, SHS, and ONS4), covering multiple facets of well-being (hedonic/affective, eudemonic, evaluative, and life satisfaction). We found significantly lower scores for misophonics in both males and females at both 17 and 23 years. This was true in all measures except Life Satisfaction at 23 years, which was the only measure to show negative effects for female misophonics but not male (perhaps because life satisfaction is typically lower for males in general, introducing a floor effect; see Figure 2).[63] Overall, our findings present a clear picture of poorer well-being in misophonics.

FIGURE 2 Scores and 95% confidence intervals (CIs) by group (misophonics, nonmisophonics) and sex-at-birth (male, female) for four well-being measures: Subjective Happiness Scale (SHS) (top-left); Satisfaction with Life Scale (SWLS) (top-right); Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) (bottom-left); Office for National Statistics 4-Item Scale (ONS4) (bottom-right). All comparisons between misophonics and nonmisophonics are significant. WEMWBS also showed a main effect of gender, and SWLS showed an interaction.
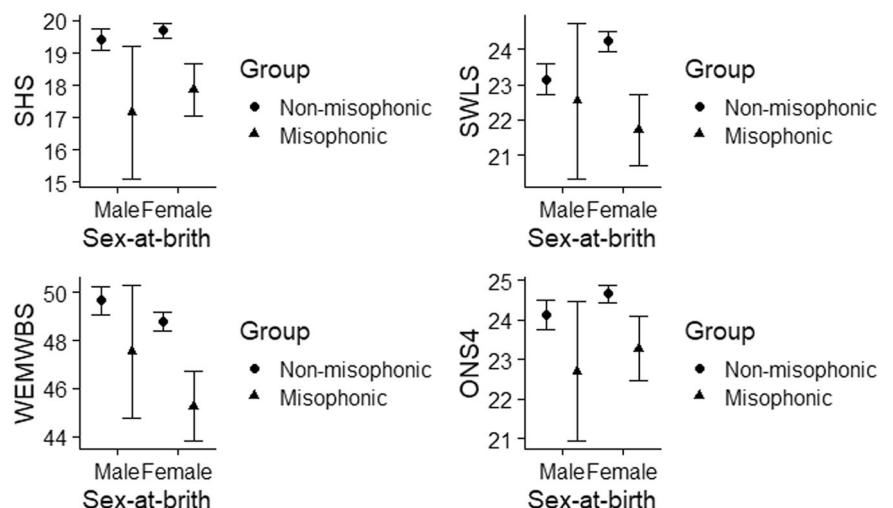
Misophonia is often assumed to manifest in early adolescence, several years prior to our earliest testing period.[14,23,64–66] This makes it likely that members of our cohort were already expressing misophonia at 16–17 years—although one important limitation of our study is that we cannot know for sure (because we screened for misophonia at 28). An alternative interpretation is that poorer well-being (and greater self-harm in females) at age 16 might have been associated with the *disposition* for misophonia, whether misophonia has already emerged or not. Future studies might engage in large-scale screening with a longer assessment targeting a very large sample of adolescents in order to identify those with misophonia in real time, and then following them over time. Since we have done similar large-scale screening with other sensory differences[67] we do not underestimate its enormous challenges, and therefore recognize both the limitations and strengths of our study.

Another possible limitation is that our group sizes were sometimes small, despite screening over 4000 participants for misophonia, of which 3000 had additionally completed our self-harm/well-being measures in earlier time-slots. Small group sizes are the natural consequence of studying rare traits (self-harm) within rare populations (with misophonia). Nonetheless, we have the distinct advantage of testing randomly sampled participants (as far as misophonia is concerned) since we did not rely on misophonics to self-refer, and we did not recruit from clinics, where the most extreme cases are likely to gather. Hence a key strength of our own study is that we make a meaningful epidemiological link between misophonia on the one hand, and poor well-being and elevated self-harm on the other.

Our study shows that self-harm and suicidal ideation were higher in the misophonia group, but the reasons are not yet definitively clear. So although higher self-harm could be the result of a daily onslaught of unpleasant sensory experiences (misophonia), it could equally be the result of the depression or anxiety which accompanies misophonia. But the critical first step is to identify that this group *is indeed at risk*— and this was the aim of our paper (using random sampling). As such, our work now suggests that clinical professionals might therefore engage in an active screening for self-harm or suicidal ideation in any patient where misophonia is confirmed (see Aazh & Moore[68], for a similar suggestion in tinnitus). Future studies may also now ask a separate question, which is *why* does this happen? A relevant approach might be to conduct clinical mental health screening alongside random misophonia sampling, showing potential links between misophonia and self-harm via the mediation of, say, anxiety or depression. Finally, since self-harm in misophonia may be exacerbated by poor understanding of misophonia itself, we also flag the reader to our online information hub (www.misophonia-hub.org).

In summary, both male and female misophonics showed poorer well-being in multiple ways. They also self-harmed more than nonmisophonics from age 16 in females and from age 24 in males, and with female misophonics having a greater intent to die (than nonmisophonics) emerging from 24 years. We conclude that misophonia is accompanied by important differences in well-being and self-harm, emerging from the teens onwards. We therefore propose better understanding and screening for people with misophonia in this regard.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

For data-access requests, see http://www.bristol.ac.uk/alspac/researchers/.

ETHICS APPROVAL STATEMENT

Approval came from the ALSPAC Ethics and Law Committee and Local Ethics Committees.

PATIENT CONSENT STATEMENT

This study used secondary data. Participants' informed consent is described at http://www.bristol.ac.uk/alspac.

CLINICAL TRIAL REGISTRATION

N/A

ORCID

Louisa J. Rinaldi http://orcid.org/0000-0003-0164-9146

REFERENCES

1. Jastreboff MM, Jastreboff PJ. Hyperacusis. 2001. Available from: https://www.audiologyonline.com/articles/hyperacusis-1223
2. Swedo S.E., Baguley DM, Denys D, Dixon LJ, Erfanian M, Fioretti A, et al. Consensus definition of misophonia: a Delphi study. Front Neurosci. 2022;16:841816. https://doi.org/10.3389/fnins.2022.841816 (Article 841816).
3. Hansen HA, Leber AB, Saygin ZM. What sound sources trigger misophonia? Not just chewing and breathing. J Clin Psychol. 2021;77(11):2609–25. https://doi.org/10.1002/JCLP.23196
4. Jager I, de Koning P, Bost T, Denys D, Vulink N. Misophonia: phenomenology, comorbidity and demographics in a large sample. PLoS One. 2020;15(4):e0231390. https://doi.org/10.1371/journal.pone.0231390

5. Simner J, Koursarou S, Rinaldi L.J., Ward J. Attention, flexibility, and imagery in misophonia: Does attention exacerbate everyday disliking of sound. Journal of Clinical and Experimental Neuropsychology. 2022;43:1006–17. https://doi.org/10.1080/13803395.2022.2056581

6. Vitoratou S, Uglik-Marucha N, Hayes C, Gregory J. Listening to people with misophonia: exploring the multiple dimensions of sound intolerance using a new psychometric tool, the s-five, in a large sample of individuals identifying with the condition. Psych. 2021;3(4):639–62. https://doi.org/10.3390/PSYCH3040041

7. Schröder A, Vulink N, Denys D. Misophonia: diagnostic criteria for a new psychiatric disorder. PLoS One. 2013;8(1):e54706. https://doi.org/10.1371/journal.pone.0054706

8. Kidger J, Heron J, Lewis G, Evans J, Gunnell D (2012). Adolescent self-harm and suicidal thoughts in the ALSPAC cohort: a self-report survey in England. https://doi.org/10.1186/1471-244X-12-69

9. Landstedt E, Gillander Gådin K. Deliberate self-harm and associated factors in 17-year-old Swedish students. Scand J Public Health. 2011;39(1):17–25. https://doi.org/10.1177/1403494810382941

10. Muehlenkamp JJ, Gutierrez PM. Risk for suicide attempts among adolescents who engage in non-suicidal self-injury. Arch Suicide Res. 2007;11(1):69–82. https://doi.org/10.1080/13811110600992902

11. Rinaldi L, Simner J. Mental health difficulties in children with misophonia: an examination of ADHD, depression & anxiety. Child Psychiatry Hum Dev. 2023; in press.

12. Siepsiak M, Sobczak AM, Bohaterewicz B, Cichocki Ł, Dragan WŁ. Prevalence of misophonia and correlates of its symptoms among inpatients with depression. Int J Environ Res Public Health. 2020;17(15):5464. https://doi.org/10.3390/IJERPH17155464

13. Cusack SE, Cash TV, Vrana SR. An examination of the relationship between misophonia, anxiety sensitivity, and obsessive-compulsive symptoms. J Obsessive-Compuls Relat Disord. 2018;18(January):67–72. https://doi.org/10.1016/j.jocrd.2018.06.004

14. Rinaldi L, Ward J, Simner J. Poorer well-being in children with misophonia: evidence from the sussex misophonia scale for adolescents. Front Psychol. 2022; in press.

15. Rosenthal MZ, McMahon K, Greenleaf AS, Cassiello-Robbins C, Guetta R, Trumbull J, et al. Phenotyping misophonia: psychiatric disorders and medical health correlates. Front Psychol. 2022;13:5665. https://doi.org/10.3389/FPSYG.2022.941898/BIBTEX

16. Nock M, Joinerjr T, Gordon K, Lloyd-Richardson E, Prinstein M. Non-suicidal self-injury among adolescents: diagnostic correlates and relation to suicide attempts. Psychiatry Res. 2006;144(1):65–72. https://doi.org/10.1016/J.PSYCHRES.2006.05.010

17. Wichstrom L. Predictors of non-suicidal self-injury versus attempted suicide: similar or different. Arch Suicide Res. 2009;13(2):105–22. https://doi.org/10.1080/13811110902834992

18. Hankin BL, Abela JRZ. Nonsuicidal self-injury in adolescence: prospective rates and risk factors in a 2 ½ year longitudinal study. Psychiatry Res. 2011;186(1):65–70. https://doi.org/10.1016/J.PSYCHRES.2010.07.056

19. Fergusson DM, Horwood LJ, Ridder EM, Beautrais AL. Suicidal behaviour in adolescence and subsequent mental health outcomes in young adulthood. Psychol Med. 2005;35(7):983–93. https://doi.org/10.1017/S0033291704004167

20. Lee A, Wong SYS, Tsang KK, Ho GSM, Wong CW, Cheng F. Understanding suicidality and correlates among Chinese secondary school students in Hong Kong. Health Promot Int. 2009;24(2):156–65. https://doi.org/10.1093/HEAPRO/DAP011

21. Brausch AM, Gutierrez PM. Differences in non-suicidal self-injury and suicide attempts in adolescents. J Youth Adolesc. 2010;39(3):233–42. https://doi.org/10.1007/S10964-009-9482-0

22. Alekri J, Al Saif F. Suicidal misophonia: a case report. Psychiatr Clin Psychopharmacol. 2019;29(2):232–7. https://doi.org/10.1080/24750573.2019.1597585

23. Dover N, McGuire JF. Family-based cognitive behavioral therapy for youth with misophonia: a case report. Cogn Behav Pract. 2023;30:169–76. https://doi.org/10.1016/J.CBPRA.2021.05.005

24. Karalis P, Carter C, Coplan B, Olabisi J. Treatment challenges for misophonia with comorbid mood and anxiety disorders, a case report. Psychiatry Res Case Rep. 2022;1(1):100012. https://doi.org/10.1016/J.PSYCR.2022.100012

25. Muller D, Khemlani-Patel S, Neziroglu F. Cognitive-behavioral therapy for an adolescent female presenting with misophonia: a case example, Clin Case Stud 2018;17(4):249–58. https://doi.org/10.1177/1534650118782650

26. Edelstein M, Brang D, Rouw R, Ramachandran VS. Misophonia: physiological investigations and case descriptions. Front Hum Neurosci. 2013;7:296. https://doi.org/10.3389/fnhum.2013.00296

27. Rouw R, Erfanian M. A large-scale study of misophonia. J Clin Psychol. 2018;74(3):453–79. https://doi.org/10.1002/jclp.22500

28. Casey P, Dunn G, Kelly BD, Lehtinen V, Dalgard OS, Dowrick C, et al. The prevalence of suicidal ideation in the general population: results from the Outcome of Depression International Network (ODIN) study. Soc Psychiatry Psychiatr Epidemiol. 2008;43(4):299–304. https://doi.org/10.1007/S00127-008-0313-5

29. Nock M.K., Borges G, Bromet EJ, Alonso J, Angermeyer M, Beautrais A, et al. Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. Br J Psychiatry. 2008;192(2):98–105.

30. Siepsiak M, Rosenthal MZ, Raj-Koziak D, Dragan W. Psychiatric and audiologic features of misophonia: use of a clinical control group with auditory over-responsivity. J Psychosom Res. 2022;156:110777. https://doi.org/10.1016/J.JPSYCHORES.2022.110777

31. Kılıç C, Öz G, Avanoğlu KB, Aksoy S. The prevalence and characteristics of misophonia in Ankara, Turkey: population-based study. BJPsych Open. 2021;7(5):e144. https://doi.org/10.1192/BJO.2021.978

32. Boyd A, Golding J, Macleod J, Lawlor DA, Fraser A, Henderson J, et al. Cohort profile: the'children of the 90s'—the index offspring of the Avon Longitudinal Study of Parents and Children. Int J Epidemiol. 2013;42(1):111–27. https://doi.org/10.1093/IJE/DYS064

33. Diener E. Subjective well-being. The science of happiness and a proposal for a national index. Am Psychol. 2000;55(1):34–43. https://doi.org/10.1037/0003-066X.55.1.34

34. Ryff CD, Keyes CLM. The structure of psychological well-being revisited. J Pers Soc Psychol. 1995;69(4):719–27. https://doi.org/10.1037/0022-3514.69.4.719

35. Erhart M, Ottova V, Gaspar T, Jericek H, Schnohr C, Alikasifoglu M, et al. Measuring mental health and well-being of school-children in 15 European countries using the KIDSCREEN-10 Index. Int J Public Health. 2009;54(S2):160–6. https://doi.org/10.1007/s00038-009-5407-7

36. The Whoqol Group. The World Health Organization quality of life assessment (WHOQOL): development and general psychometric properties. Soc Sci Med. 1998;46(12):1569–85. https://doi.org/10.1016/S0277-9536(98)00009-4

37. Fraser A, Macdonald-wallis C, Tilling K, Boyd A, Golding J, Davey smith G, et al. Cohort Profile: the Avon Longitudinal Study of Parents and Children: ALSPAC mothers cohort. Int J Epidemiol. 2013;42(1):97–110. https://doi.org/10.1093/IJE/DYS066

38. Northstone K, Lewcock M, Groom A, Boyd A, Macleod J, Timpson N, et al. The Avon Longitudinal Study of Parents and Children (ALSPAC): an update on the enrolled sample of index children in 2019. Wellcome Open Res. 2019;4:51. https://doi.org/10.12688/WELLCOMEOPENRES.15132.1

39. Hall AJ, Humphriss R, Baguley DM, Parker M, Steer CD. Prevalence and risk factors for reduced sound tolerance (hyperacusis) in children. Int J Audiol. 2016;55(3):135–41. https://doi.org/10.3109/14992027.2015.1092055

40. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez NR, Conde JD. A metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform. 2009;42:337–81.

41. Paykel ES, Myers JK, Lindenthal JJ, Tanner J. Suicidal feelings in the general population: a prevalence study. Br J Psychiatry. 1974;124(0):460–9. https://doi.org/10.1192/BJP.124.5.460

42. Roberts E, Fraser A, Gunnell D, Joinson C, Mars B. Timing of menarche and self-harm in adolescence and adulthood: a population-based cohort study. Psychol Med. 2020;50(12):2010–8. https://doi.org/10.1017/S0033291719002095

43. Roberts E, Joinson C, Gunnell D, Fraser A, Mars B. Pubertal timing and self-harm: a prospective cohort analysis of males and females. Epidemiol Psychiatr Sci. 2020;29:e170. https://doi.org/10.1017/S2045796020000839

44. Easey KE, Mars B, Pearson R, Heron J, Gunnell D. Association of birth order with adolescent mental health and suicide attempts: a population-based longitudinal study. Eur Child Adolesc Psychiatry. 2019;28(8):1079–86. https://doi.org/10.1007/S00787-018-1266-1/FIGURES/2

45. Hammerton G, Zammit S, Thapar A, Collishaw S. Explaining risk for suicidal ideation in adolescent offspring of mothers with depression. Psychol Med. 2016;46(2):265–75. https://doi.org/10.1017/S0033291715001671

46. Tennant R, Hiller L, Fishwick R, Platt S, Joseph S, Weich S, et al. The Warwick-Edinburgh Mental Well-Being Scale (WEMWBS): development and UK validation. Health Qual Life Outcomes. 2007;5(1):63. https://doi.org/10.1186/1477-7525-5-63/TABLES/4

47. Clarke A, Putz R, Friede T, Ashdown J, Adi Y, Martin S, et al. (2010). Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) acceptability and validation in English and Scottish secondary school students (The WAVES Project). National Health Serivce.

48. WHO. Wellbeing measures in primary health care/The Depcare Project. WHO Regional Office for Europe; 1998.

49. Dolan P, Metcalfe R. Measuring subjective wellbeing: recommendations on measures for use by national governments. J Soc Policy. 2012;41(2):409–27. https://doi.org/10.1017/S0047279411000833

50. Tinkler L. The Office for National Statistics experience of collecting and measuring subjective well-being. Stat Transit. 2015;16(3):373–96. https://doi.org/10.21307/STATTRANS-2015-021

51. Benson T, Sladen J, Liles A, Potts HWW. Personal Wellbeing Score (PWS)—a short version of ONS4: development and validation in social prescribing. BMJ Open Qual. 2019;8(2):e000394. https://doi.org/10.1136/BMJOQ-2018-000394

52. Lyubomirsky S, Lepper HS. A measure of subjective happiness: preliminary reliability and construct validation. Soc Indic Res. 1999;46(2):137–55. https://doi.org/10.1023/A:1006824100041.

53. Zager Kocjan G, Jose PE, Sočan G, Avsec A. Measurement invariance of the subjective happiness scale across countries, gender, age, and time. Assessment. 2022;29(4):826–41. https://doi.org/10.1177/1073191121993558

54. Diener E, Emmons RA, Larsen RJ, Griffin S. The Satisfaction With Life Scale. J Pers Assess. 1985;49(1):71–5. https://doi.org/10.1207/s15327752jpa4901_13

55. López-Ortega M, Torres-Castro S, Rosas-Carrasco O. Psychometric properties of the Satisfaction with Life Scale (SWLS): secondary analysis of the Mexican Health and Aging Study. Health Qual Life Outcomes. 2016;14(1):170. https://doi.org/10.1186/S12955-016-0573-9/TABLES/5

56. Durak M, Senol-Durak E, Gencoz T. Psychometric properties of the satisfaction with life scale among Turkish university students, correctional officers, and elderly adults. Soc Indic Res. 2010;99(3):413–29. https://doi.org/10.1007/S11205-010-9589-4

57. Pavot W, Diener E. Review of the satisfaction with life scaleo. 2009. p. 101–17. https://doi.org/10.1007/978-90-481-2354-4_5

58. Vázquez C, Duque A, Hervás G. Satisfaction with life scale in a representative sample of Spanish adults: validation and normative data. Span J Psychol. 2013;16:E82. https://doi.org/10.1017/SJP.2013.82

59. Hawton K, Hall S, Simkin S, Bale L, Bond A, Codd S, et al. Deliberate self-harm in adolescents: a study of characteristics and trends in Oxford, 1990-2000. J Child Psychol Psychiatry. 2003;44(8):1191–8. https://doi.org/10.1111/1469-7610.00200

60. Levene H. Robust tests for equality of variances. In: Olkin I editor. Contributions to probability and statistics. Stanford University Press; 1960. p. 278–92. https://cir.nii.ac.jp/crid/1573950400526848896

61. Box G.E.P. A general distribution theory for a class of likelihood criteria. Biometrika. 1949;36(3–4):317–46. https://doi.org/10.1093/BIOMET/36.3-4.317

62. R Core Team. R: A language and environment for statistical computing. R Foundation for Statistical Computing; 2021.

63. Joshanloo M, Jovanović V. The relationship between gender and life satisfaction: analysis across demographic groups and global regions. Arch Womens Ment Health. 2020;23(3):331–8. https://doi.org/10.1007/S00737-019-00998-W/TABLES/3

64. Johnson PL, Webber TA, Wu MS, Lewin AB, Murphy TK, Storch EA. When selective audiovisual stimuli become unbearable: a case series on pediatric misophonia. Neuropsychiatry. 2013;3(6):569–75. https://doi.org/10.2217/NPY.13.70

65. Kamody RC, del Conte GS. Using dialectical behavior therapy to treat misophonia in adolescence. Prim Care Comp CNS Disord. 2017;19(5):17102105. https://doi.org/10.4088/PCC.17L02105

66. Webber TA, Johnson PL, Storch EA. Pediatric misophonia with comorbid obsessive-compulsive spectrum disorders. Gen Hosp Psychiatry. 2014;36:231.e1–e2. https://doi.org/10.1016/j.genhosppsych.2013.10.018

67. Simner J, Smees R, Rinaldi LJ, Carmichael DA. Wellbeing differences in children with synaesthesia: anxiety and mood regulation. Front Biosci. 2021;13:195–215.

68. Aazh H, Moore BC. Thoughts about suicide and self-harm in patients with tinnitus and hyperacusis. J Am Acad Audiol. 2018;29(3):255–61.