Misophonia reactions in the general population are correlated with strong emotional reactions to other everyday sensory-emotional experiences

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Abstract

Although misophonia may be a diagnosable disorder, misophonic reactions are common in the general population, and they may shed light on everyday emotional reactions to multi-modal stimuli. We performed an online study of a non-clinical sample to understand the extent to which adults who have misophonic reactions are generally reactive to a range of audio-visual emotion-inducing stimuli. We also hypothesized that musicality might be predictive of one's emotional reactions to these stimuli because music is an activity that involves strong connections between sensory processing and meaningful emotional experiences. Participants completed self-report scales of misophonia and musicality, and watched videos meant to induce misophonia, autonomous sensory meridian response (ASMR), and musical chills, and responded by clicking a button when they had any sort of emotional reaction. At the end of each video, they rated the emotional valence and arousal of the video. Reactions to misophonia videos were predicted by reactions to ASMR and chills videos, which could indicate that the frequency with which individuals experience emotional responses varies similarly across both negative and positive emotional contexts. Musicality scores did not correlate with measures of misophonia. These findings could reflect a general phenotype of stronger emotional reactivity to meaningful sensory inputs.

Keywords: misophonia, autonomous sensory meridian response (ASMR), musical chills, frisson, musicality, emotion

Background

Misophonia is a relatively newly named psychological disorder characterized by negative emotional reactions to everyday sounds like chewing, tapping, breathing, and other human-produced and animal-produced actions [1–3]. The recent consensus definition for misophonia classifies the disorder as a decreased tolerance to specific sounds and separates misophonia from other decreased sound tolerance disorders like hyperacusis and tinnitus, as it is the context or meaning of the sound and not the loudness that elicits a misophonic response [3]. While experimental evidence shows that the auditory modality is key to the experience of misophonia [4], the high-level nature of misophonia is reflected in evidence that unpleasant sounds can be made less aversive by pairing them with videos that come from less aversive sound-producing objects [5,6]. Individuals' misophonia scores correlate positively with disgust sensitivity and emotional dysregulation scores but negatively with adjusting and tolerating affective styles (which entail greater acceptance and less defensiveness) [7]. Misophonia also correlates with neuroticism, anxiety, depression, obsessiveness, and the number of personality disorder symptoms [8–12]. These findings suggest that misophonia is much more than a sensory-processing disorder and may be caused by abnormalities in affective processing that lead individuals with misophonia to have aversive emotional reactions to stimuli that others do not find particularly bothersome.

Consistent with this, early clinical descriptions of misophonia point out that misophonia occurs without any apparent low-level hearing impairment [1,2]. Undergraduates with moderate misophonia had normal pure-tone thresholds up to 16 kHz and normal latencies and amplitudes of waves I, III, and V of the auditory brainstem event-related potentials (ERPs) compared to control and mild misophonia undergraduates (group *n*s = 15) [13]. A study of 257 audiology patients also showed no relation between pure-tone hearing thresholds and misophonia symptoms; instead, misophonia symptoms correlated with such higher-level characteristics as having lower uncomfortable loudness levels; larger frequency slopes of uncomfortable loudness levels; and comorbidity with tinnitus, hyperacusis, anxiety, and depression [14].

In contrast to the apparently intact peripheral processing in misophonia, auditory cortical N1 ERPs in response to oddball/infrequent tones were smaller in patients with misophonia compared to a control group, but were no different for standard/frequent tones [15]. This difference could reflect an abnormally small mismatch negativity in people with misophonia, although this study did not attempt to distinguish the N1 from the slightly later mismatch negativity response. Evidence from functional magnetic resonance imaging (fMRI) suggests that compared to those without misophonia, patients with misophonia have increased activation of the auditory cortex, anterior insula, and anterior cingulate cortex to misophonia triggers [16]. There is also evidence for central abnormalities in misophonia, such as increased fMRI activation of posterior cingulate cortex, superior medial frontal cortex, and dorsolateral prefrontal cortex during a response inhibition task [17]; activation of auditory cortex, insula, orofacial motor cortex, premotor cortex, prefrontal cortex, hippocampus, and cerebellum while listening to misophonia triggers [18–20]; and functional connectivity patterns of insula, auditory cortex, visual cortex, and ventral premotor cortex with a variety of other areas [19–21]. Thus, like behavioral findings, studies of brain activity implicate a wide range of cortical areas depending on the task, underscoring the importance of high-level affective processing and emotion regulation mechanisms in misophonia.

Relatively little is known about the expression of misophonia in the general population, even though non-clinical studies suggest that at least mild misophonic experiences are quite common [14,22–24]. Misophonia's relations with other aspects of auditory processing in the general population are even less studied, especially those that evoke positive emotional responses such as autonomous sensory meridian response (ASMR) videos and musical chills [25]. Like misophonia, ASMR entails a combination of complex emotional responses that are driven by meaningful audio-visual stimuli, including relaxation and tingling that starts in the head and moves down towards the extremities [25–27]. Common ASMR triggers overlap with misophonia triggers such as chewing, breathing, and tapping, but include others that are more unique to ASMR like origami folding, hair brushing, and pouring of liquid (Barratt et al., 2017). Not only do ASMR and misophonia share some triggers, people who tend to experience ASMR also experience misophonia more than those who do not experience ASMR [28,29]. There is also evidence for overlap in personality traits associated with both ASMR and misophonia such as neuroticism [30–32] and schizotypal traits [33,34].

Both ASMR and musical chills can include tingling sensations; however, musical chills are typically evoked by emotionally intense moments in music rather than environmental sounds [35–38]. Most listeners report experiencing chills when there are surprising or unexpected events, suggesting that musical knowledge, expectations, and skills could play a role in the likelihood of experiencing them [39].

While some studies report that musicians experience chills more often than non-musicians [40–42], most listeners—regardless of music training—can recognize emotions conveyed in music [43–46], and as many as 90% of listeners report experiencing musical chills at least sometimes [38,41,47]. This is consistent with the notion that one does not have to be a musician to be musical: Music aptitude and engagement vary widely in the untrained population and predict emotional processing both within and outside the context of music [48–50].

Thus, the experience of musical chills may rely on general emotional processes relevant for ASMR and misophonia. This is consistent with evidence for weak to moderate correlations between ASMR and chills propensity [51]. Similarly, both ASMR and musical chills may be correlated with openness to experience [32,41,52–54]. Although musicians anecdotally report experiencing misophonia [55], evidence for the relationship between misophonia and musicality is mixed [56,57]. To our knowledge, no studies have examined the relationship between misophonia and musical chills.

Overlapping brain areas appear to be involved in misophonia, ASMR, and musical chills, as suggested by fMRI studies showing activation of such areas as the insula, ventral striatum, and cingulate cortex across these phenomena [17–20,58–62]. Furthermore, people who experience ASMR have greater interoceptive sensitivity and body awareness [63], and overlapping parts of the insula are active while judging one's own heartbeat and judging one's emotional reactions to videos [64]. Heartbeat ERP amplitude – which arises from the insula as a hub of interoceptive processing [65–67] – is larger in people who experience ASMR frequently than in people who experience ASMR infrequently [68], although this study failed to find group differences on behavioral measures of interoceptive awareness. We measured the number of reactions, as well as valence and arousal ratings to videos meant to evoke misophonia, ASMR, and musical chills in the same participants to examine if these real-time experiences correlate with each other.

To address the limitations in our knowledge about misophonia in the general population and how it relates to ASMR, musical chills, and musicality, we conducted an online study of almost 300 adult participants who filled out a misophonia self-report scale, questions about ASMR, and a musical sophistication scale with a sub-factor measuring emotional engagement with music [69,70]. Participants watched videos meant to evoke misophonia, ASMR, musical chills, annoyance, or neutral feelings, and responded in real time to any emotional reactions by pressing a button; participants also provided arousal and valence ratings after each video. We hypothesized that people who tend to have stronger misophonic reactions might also tend to have stronger emotional reactions of other types, such as ASMR and musical chills, and might also have stronger emotional engagement with music. Alternatively, people who have strong misophonic reactions might only have stronger reactions to other negative stimuli.

Methods

Participants

A total of 301 people participated in this study. Participants were eligible to take the study if they were at least 18 years of age, spoke English proficiently, were healthy (e.g., no cold, ear infection), and had normal-to-corrected hearing and vision. We excluded participants who failed attention and headphone checks (N=16) or who had difficulty loading most or all of the sounds (N=7) (see Headphone and Attention Checks below), resulting in a final sample of 278 participants (166 women) (Table 1). Participants were recruited from the UNLV Psychology Participant Pool (SONA) (20.9%); university listservs (9%); snowball sampling with family and friends of the lab (21.6%); or advertisements posted on personal and lab social media pages (2.5%), reddit pages (39.2%), Facebook groups (5.8%), and misophonia support/advocacy groups (1%). Two different versions of advertisements were posted on social media pages. The first, general advertisement described the study as investigating emotional responses to meaningful sounds in the world. The second ad specifically mentioned misophonia, ASMR, and musical chills and was only posted to reddit pages or Facebook groups directly related to these experiences. Participants were not recruited based on music training or musical expertise.

Apparatus and Procedure

This study was implemented online using the online survey builder Qualtrics (Qualtrics, Provo, UT). Participants were asked to wear headphones and use a tablet, laptop, or computer in a quiet environment free from distractions. No mobile phones were allowed.

Upon clicking on the Qualtrics survey link, participants were to consent before taking part in this study. The study began with a headphone check, followed by separate misophonia, ASMR, and musical chills blocks, presented in a random order. Each of these blocks first presented a definition of the phenomenon (misophonia, ASMR, or chills), self-report questions, and the video reactions task. Next, participants completed the Gold-MSI and answered additional background questions. Finally, participants completed attention checks and follow-up questions about recruitment, feedback on the study, and future research participation.

Misophonia self-report. Before answering any survey questions about misophonia specifically, participants were provided the following definition of misophonia: “Misophonia is a condition characterized by the experience of strong negative reactions (e.g., anger and anxiety) to everyday (trigger) sounds, such as eating, breathing, tapping, etc.” This survey was initiated prior to publication of the consensus definition of misophonia [3].

Participants then completed the Amsterdam Misophonia Scale (A-MISO-S), which presents six items, each yielding a score from 0–4 that contributes to an overall misophonia severity score [71]. Scored items ask about (1) amount of time spent occupied by misophonic sounds; (2) misophonia’s interference with social functioning; (3) level of distress and anger towards misophonic sounds; (4) effort to resist the misophonic sounds; (5) control over thoughts and anger about the sounds; and (6) time spent avoiding misophonic situations. According to Schröder et al. [71], overall scores from 0–4 are considered subclinical, 5–9 are mild, 10–14 are moderate, 15–19 are severe, and 20–24 are extreme. We used the overall A-MISO-S score as a measure of misophonia severity.

Along with the A-MISO-S, we asked additional questions about misophonia, including "Have you been clinically diagnosed with misophonia?" and "If you have not been clinically diagnosed with misophonia, do you believe you have this condition?" Participants were then presented with a list of 26 common triggers and asked to select all of the sounds that bother them, followed by an open-ended prompt to list unlisted bothersome sounds. Participants also self-reported the age they first experienced stress to these sounds, as well as the emotions that sounds elicit (choosing from irritation, anger, fear, disgust, or open-ended response).

ASMR and chills self-report. We also provided definitions of ASMR and chills to participants before they answered questions about each experience. We defined ASMR as "a relaxed state in which individuals experience tingling, typically across the back of the head and shoulders, in response to certain stimuli. These stimuli often (but do not necessarily) include whispering, crisp noises (such as tinfoil), and watching others do simple repetitive tasks. ASMR is not frisson (e.g., musical chills when listening to music)." Participants were asked whether or not they experience ASMR (yes, no, unsure), whether ASMR relaxes them, and whether they purposefully search for ASMR videos.

Musical chills was defined as follows: "When listening to music, some people experience musical chills (e.g., frisson), which are often described as 'a rapidly spreading, tingling feeling' often accompanied by raised hairs and goosebumps. These feelings of a tingle or shudder might be physical, emotional, or both." The participant was then asked if he/she experiences musical chills (yes, no, unsure).

Video Reactions Task. Participants were presented a total of 37 videos across three blocks of testing. Ten 15-s long videos were presented for each of the misophonia and ASMR blocks, and five 60-s music videos were presented in the musical chills block. In addition, ten 15-s "neutral" videos were randomly interspersed throughout the three blocks, as well as two 15-s videos intended to be "annoying" by most participants regardless of misophonia. See Table S1 for the list of videos, and the following link to view the videos: https://osf.io/k6h2m/.

Videos were selected by a small group of listeners (*N*=6) using an iterative stimulus selection process to find, select, and edit YouTube videos. ASMR and misophonia videos were chosen based on common triggers in the literature [26,72–74]. Prior studies of musical chills have used a range of classical, popular, film, and live music recordings, often self-selected by the participant and typically presented in the auditory modality [39]. Because we wanted to present videos across all conditions, we perused internet forums listing songs that elicit chills and then found videos of live performances for each song. We then selected from among these videos the five videos that elicited the most chills among our small listener group. We also selected a set of environmental videos intended to be emotionally neutral, such as a scenes from a campfire, the beach, or a thunderstorm (see Table S1). Finally, two videos (baby crying, fingernails on a chalkboard) were selected that were expected to be aversive to all participants, regardless of misophonia [75,76].

Videos played automatically on each trial, but participants could immediately advance to the next trial if a particular video was too upsetting. At the beginning of the Video Reactions Task for each block, participants were given a reminder definition for each phenomenon (misophonia, ASMR, or musical chills). While watching videos, participants were instructed to click on a gray box positioned below the video each time they felt any emotional reaction to the video. These reactions could be tingles on the back of the neck; chills; goosebumps; tears, or irritation, disgust, pleasure, or relaxation. After the video ended, we used the Self-Assessment Manikin [77] to prompt participants to provide a rating of valence ("How would you rate the pleasantness of this video?") and arousal ("How relaxed or stimulated did you feel in response to the video?"), on a 5-point scale from -2 to +2. This task thus yielded for each video a real-time measure of a subject's emotional reactions (total clicks during the video), as well as the subject's valence and arousal ratings for that video.

Musicality and Background Measures. Musicality was measured using the Goldsmiths Musical Sophistication Index (Gold-MSI). The Gold-MSI is a 39-item questionnaire measuring five factors of musical sophistication: active engagement, perceptual abilities, musical training, singing abilities, and emotional engagement [70]. For our analyses, we used the overall Gold-MSI score (ω_h=.94) as well as the emotional engagement sub-factor (ω_h=.77), given our hypothesis that misophonia might entail stronger emotional reactions and engagement to music. The ω_h values above .70 indicate acceptable internal consistency [78]. Immediately after the Gold-MSI questions, we asked demographic questions about participant age, gender, ethnicity, current country of residence, as well as questions about language background, country of residence during childhood/adolescence, current occupational status, highest education acquired, parents educational background, number of languages spoken, and music habits such as how often the participant listens to music or plays an instrument, family members who are musicians, and so on.

Headphone and Attention Checks. At the start of the study, participants completed a headphone check by judging which of three pure tones were the quietest across six trials, with one of the tones being presented out of phase and thus noticeably quieter only if the participant wore headphones [79]. Participants failed the headphone check if they missed four or more trials.

To ensure optimal quality of on-line data collection, at the end of the study we asked five attention check questions to assess whether participants were paying attention, following instructions, and performing the task in an appropriate environment [80]. One question instructed participants to respond incorrectly, on purpose ("What color is the sky? Please answer this incorrectly, on purpose, by choosing YELLOW instead of blue"). We also asked participants how noisy their testing environment was, whether they wore headphones, and if they had trouble loading videos and sounds. Finally, we asked them to tell us how carefully they completed the study ("How carefully did you complete the study? Please answer honestly" with response options from "not at all carefully" to "very carefully"). As noted above, we excluded data from any participants who failed the headphone check while testing in a noisy environment, who incorrectly answered two or more attention check questions, or who had problems loading most or all of the sounds.

Data Analysis. Our data are available at this link: https://osf.io/k6h2m/. All analyses were conducted using JASP (Version 0.17.3). A Bayes Factor (BF) in support of the null hypothesis (BF_{01}) or the non-null hypothesis (BF_{10}) was reported for each analysis, and interpreted as follows: BF > 1 is "anecdotal evidence"; BF > 3 is "some evidence"; BF > 10 is "strong evidence"; and BF > 30 is "very strong evidence" (Rouder et al., 2009; Schmalz et al., 2023). Pearson's correlations (prior width=1.0, alternative hypothesis=correlated) were calculated along with an accompanying BF_{01} or BF_{10} for the following variables: A-MISO-S scores; reactions, valence, and arousal for misophonia, ASMR, and musical chills videos; and the overall score for Gold-MSI and the Emotional Engagement sub-score.

Three Bayesian regressions were conducted using misophonia reactions, ASMR reactions, and chills reactions as dependent variables, respectively. Predictors were A-MISO-S, the valence and arousal for the corresponding type of video, and the reactions for the other two types of videos. For example, the regression predicting misophonia reactions used A-MISO-S, valence and arousal ratings for the misophonia videos, and ASMR and chills video reactions as predictor variables. Comparisons were made to the null model and the preferred model was the one with the highest BF_{10} value, regardless of R^2 value. The best 10 models are displayed in the regression tables. The Prior was JZS with r-scale=0.354, and the Model Prior was Beta binomial with parameters a=1 and b=1. The sampling method was BAS with number of models=0, and the number of samples for credible interval calculation=1000.

Results

Planned Analysis: Correlations

As seen in Table S2 and Figure 1, misophonia reactions correlated with A-MISO-S scores, validating our use of this real-time measure of misophonia. Misophonia reactions, ASMR reactions, and chills reactions all correlated moderately with each other (see Figure 1 for scatterplots), providing initial evidence that people who have relatively frequent misophonia reactions also have relatively frequent ASMR and chills reactions. Consistent with this finding, A-MISO-S scores also correlated with ASMR reactions but less so with chills. Misophonia reactions correlated negatively with misophonia valence, and positively with misophonia arousal, demonstrating that subjects who had more frequent reactions to misophonia videos also gave those videos more negative evaluations and higher arousal ratings. A-MISO-S scores showed a similar pattern of correlation with misophonia valence and arousal.

ASMR reactions were negatively predicted by ASMR valence and positively predicted by ASMR arousal, which stands in contrast to reports in the literature that ASMR is usually experienced as pleasant and relaxing [26,26,27]. Instead, this result suggests that at least some participants in our sample had misophonic reactions to some or all ASMR videos, a possibility we explore below (Exploratory Analysis).

As shown in Table S3, neither the overall Gold-MSI scores nor the Emotional Engagement sub-factor correlated above $r = .12$ with A-MISO-S or reactions, valence and arousal to misophonia or ASMR videos. Furthermore, many of the correlations were much smaller than $r = .10$, with some BF_{01} values > 10, i.e., supporting the null hypothesis. Chills video valence correlated with Emotional Engagement; however, Emotional Engagement did not correlate with chills reactions, consistent with the notion that musical sophistication does not robustly predict musical chills experience [70]. Consequently, none of the Gold-MSI scores were used in the following regressions.

Planned Analysis: Regressions

Table S4-S9 shows which sets of regression predictors resulted in the best R^2 values and BF_{10} values for the three dependent variables: misophonia video reactions, ASMR video reactions, and chills video reactions. The highest BF_{10} value predicting the misophonia video reactions (Table S4) resulted from the model that included misophonia valence, ASMR reactions, chills reactions, and A-MISO-S as predictors (see Table S5 for predictor coefficient estimates), which only had a slightly lower R^2 than the full model. The highest BF_{10} value for the ASMR video reactions (Table S6) resulted from the model that included ASMR arousal, misophonia reactions, and chills reactions (see Table S7 for predictor coefficient estimates), which only had a slightly lower R^2 than the full model. The best BF_{10} value for the chills video reactions (Table S8) resulted from the model that included chills arousal, misophonia reactions, and ASMR reactions (see Table S9 for predictor coefficient estimates), which only had a slightly lower R^2 than the full model.

Thus, for all three video types, the number of reactions across participants was generally best predicted by reactions to the other two video types, and arousal to the video type being predicted. For misophonia video reactions, the best model also included misophonia video valence and A-MISO-S scores, but A-MISO-S was not a strong predictor for the ASMR and chills reactions regressions. The fact that reactions to any one video type was predicted by reactions to the other video types supports the notion that some people tend to have more emotional reactions while watching videos as a general characteristic, rather than having a high level of reactivity only to one video type.

Exploratory Analysis: Re-Coded Data Regressions

As noted above in the Background, ASMR videos sometimes give rise to misophonia reactions. To see if this was the case in the present study and whether the regressions above were mixing ASMR and misophonia responses within the same regression, we plotted distributions of valence for the three video conditions to check if misophonia videos were generally experienced negatively and ASMR videos were generally experienced positively. We also plotted valence distributions for the other types of videos, e.g., to see if the neutral videos were indeed experienced with neutral valence. As shown in Figure 2, participants' ratings for misophonia videos were mostly negative, as intended, with only a few ratings near or above zero. Despite the expectation that ASMR videos would elicit positive emotion, participants' ratings for this type of video had more negative than positive responses. Musical chills videos were mostly experienced with positive valence, as expected. Surprisingly, neutral videos were experienced with mostly positive valence. Finally, annoying videos were experienced with negative valence.

Therefore, we recoded our Video Reactions Task data according to valence to obtain purer measures of misophonia and ASMR experiences. We did not recode responses to musical chills videos because chills is considered a distinct phenomenon from ASMR, even though both are positive experiences [37,81]. Likewise, we did not recode annoying videos because misophonia reactions are thought to be distinct from general sounds that annoy everyone, like babies crying and nails on a chalkboard [75]. However, we recoded the neutral videos because some of them included sounds like wind blowing, fire, and water sounds that are often described as potential ASMR triggers [36,82]. Table S1 provides detailed information about the 37 videos, including mean valence and arousal for each video and correlations between the Video Reactions Task measures.

For this exploratory analysis, we recoded misophonia, ASMR, and neutral videos to create two new valence-based categories of reactions for each participant. Specifically, any video that was rated by a particular participant as having a valence of -2 or -1 was considered “negative” and any video with a valence rating of 1 or 2 was considered “positive,” and mean reactions and arousal ratings were re-calculated for the new positive and negative video categories. Videos with valence ratings of 0 were not included in these means. We then performed correlations using the new variables, and two Bayesian regressions, one predicting reactions to negative valence videos and one predicting reactions to positive valence videos. Predictors for these regressions included A-MISO-S, reactions to the opposite valence videos, reactions to the chills videos, and arousal for the corresponding valence videos.

As shown in Table S10 and Figure 3, A-MISO-S correlated strongly with reactions and arousal ratings for negative valence videos but less so for reactions and arousal ratings for the positive valence videos. Similarly, reactions and arousal ratings correlated only for the same valence category (e.g., reactions to negative valence videos correlated with arousal to negative valence videos but not with arousal to positive valence videos). This result is consistent with our interpretation that the recoded negative valence category more purely reflects misophonia reactions. As before, however, negative and positive reactions still correlated with each other. In contrast, reactions or arousal to recoded video categories did not correlate with the Gold-MSI scores (Table S11).

Table S12 shows that the best BF_{10} value for the reactions to negative valence videos resulted from the full model (see Table S13 for predictor coefficient estimates). Table S14 shows that best BF_{10} value for reactions to positive valence videos resulted from the model that included arousal to positive valence videos, reactions to negative valence videos, and chills reactions (see Table S15 for predictor coefficient estimates), which had the same R^2 value as the full model. These findings are reminiscent of our planned regressions, with same-valence arousal, and reactions to other types of videos consistently predicting reactions for both negative and positive valence videos. Given that we believe these two types of reactions more accurately reflect misophonia and ASMR reactions, respectively, we believe this analysis further solidifies our original interpretation, namely that some people are more emotionally reactive, regardless of the type of emotional experience.

Discussion

Our non-clinical sample of participants completed self-reports of misophonia and musicality, and then indicated their emotional responses to several types of videos. Our main finding was that emotional reactions to misophonia, ASMR, and musical chills videos all correlated. This pattern remained even after re-categorizing reactions to misophonia, ASMR, and neutral videos based on each participant's valence ratings for that video to increase the likelihood that negative and positive video categories gave rise to misophonia and ASMR experiences, respectively. Regressions further underscored the power of misophonia, ASMR, and musical chills reactions to predict each other. We also found that self-reported misophonia severity correlated with reactions, valence, and arousal responses to misophonia videos, validating this real-time task. In contrast, neither general musical sophistication nor specific musical emotional engagement had any discernible predictive power for self-reported misophonia, nor misophonia, ASMR, or musical chills reactions; moreover, Bayesian analyses provided evidence in favor of null relationships in several of these cases. We conclude that the correlations between the amount of reactions for different types of emotional experiences, both positive (ASMR, musical chills) and negative (misophonia), may reveal a possible emotional reactivity characteristic in the general population and/or enhanced interoceptive processing. Below, we provide more detail about the logic behind this argument.

Findings from prior studies and informal observations are consistent with our suggestion that misophonia, ASMR, and musical chills may share common mechanisms. For example, anecdotal evidence abounds that similar types of videos can evoke misophonia in some people and ASMR in other people. This is consistent with emotion theories that emphasize appraisal in explaining how people react emotionally to complex real-world stimuli as varied as faces, pictures, speech, and music [83–86]. ASMR and musical chills are also linked by the anecdotal observation that both involve tingling, suggestive of similar peripheral mechanisms, though this may vary based on the type of musical chills. In particular, it is possible that ASMR is more linked to social chills than vigilance chills [35] given that ASMR is strongly linked to social closeness [60,87].

Our results add to extensive evidence for links between misophonia, ASMR, and musical chills. Specifically, the tendency to experience the three emotional phenomena correlates with overlapping personality characteristics such as neuroticism [30–32] and openness to experience [32,41,53,54]. Furthermore, fMRI studies show that all three experiences co-occur with activity in brain areas such as the insula, ventral striatum, and cingulate cortex [17–20,58–62]. The insula is important for both emotion processing and interoceptive processing [65–67], and interoceptive sensitivity predicts ASMR experience [63]. Therefore, our observation that misophonia, ASMR, and musical chills reactions intercorrelate could reflect a general tendency to react emotionally to complex real-world audio-visual stimuli in a manner that is mediated by interoceptive processing of affective states.

The finding that self-reported misophonia correlated with reactions, valence, and arousal to misophonia videos supports the possibility that measures derived from real-time misophonia experiences could be useful for clinical purposes in addition to using self-report questionnaires. For example, using both retrospective and real-time measures of misophonia could help produce a more robust and complete description of peoples' misophonia for the purpose of diagnosis and evaluation of the efficacy of various types of treatments. Furthermore, real-time measures of misophonia experience may have some advantages over self-report questionnaires. For example, measuring participants' real-time reactions may be less affected by various types of inaccuracies people may exhibit for what triggers their misophonia in everyday life [88–90].

Despite the fact that we found three kinds of emotional reactions to videos to correlate with each other, a self-report measure of musical emotional engagement did not correlate with misophonia, ASMR, or musical chills reactions to videos. This suggests that the correlations between misophonia, ASMR, or musical chills reactions were not driven by a highly general form of emotionality, but may be specific to real-time emotional reactions to complex audio-visual stimuli. Self-reported musical sophistication also did not correlate with A-MISO-S scores, or misophonia, ASMR, or musical chills reactions. However, it is possible that specific abilities measured by objective music perception tasks may correlate with misophonia, which could be useful for development of predictive models of misophonia.

In summary, we tested a large sample of participants on self-report measures of misophonia, general musical sophistication, and musical emotional engagement, and real-time reactions to misophonia, ASMR, and musical chills videos. We found that misophonia, ASMR, and musical chills reactions to videos all correlated with each other. Furthermore, misophonia video reactions also correlated with self-report misophonia scores, providing validation that real-time reactions to videos may have utility for misophonia assessment purposes. Finally, we found no evidence that musical sophistication nor musical emotional engagement correlated with misophonia. Future studies should more thoroughly test for relations between misophonia and various aspects of musicality, since both characteristics involve strong connections between high-level auditory processing and emotion.

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Figure Captions

Figure 1. Scatterplots for A-MISO-S, and reactions to misophonia, chills, and ASMR videos. A. ASMR and misophonia reactions correlation. B. ASMR and chills reactions correlation. C. Chills and misophonia reactions correlation. D. A-MISO-S and misophonia reactions correlation.

Figure 2. Histograms showing distribution of valence values for misophonia (A), ASMR (B), chills (C), neutral (D), and annoying (E) videos.

Figure 3. Scatterplots for A-MISO-S, and reactions to negative and positive valence videos. A. Positive and negative reactions correlation. B. Positive and chills reactions correlation. C. Chills and negative reactions correlation. D. A-MISO-S and negative reactions correlation.

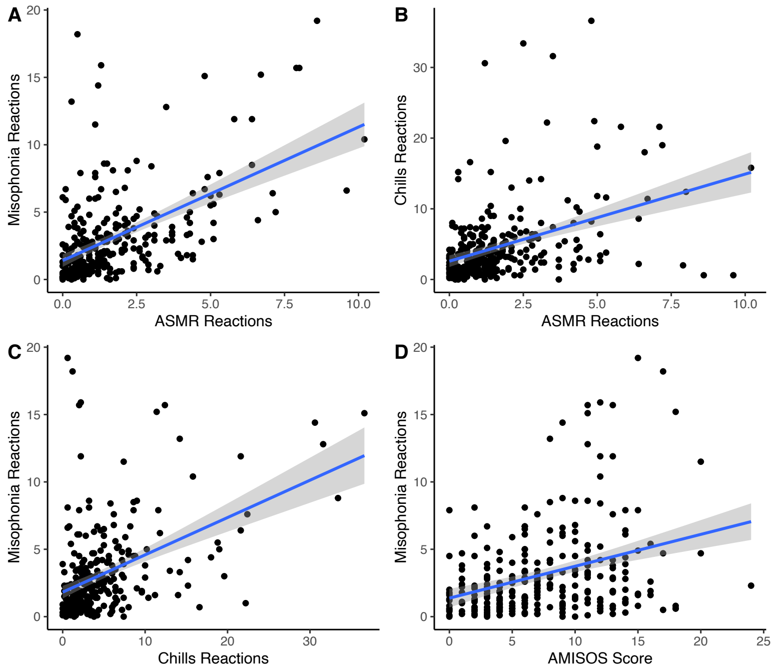
A
B
C
D
Misophonia Reactions
Chills Reactions
ASMR Reactions
Chills Reactions
AMISOS Score

Figure 1

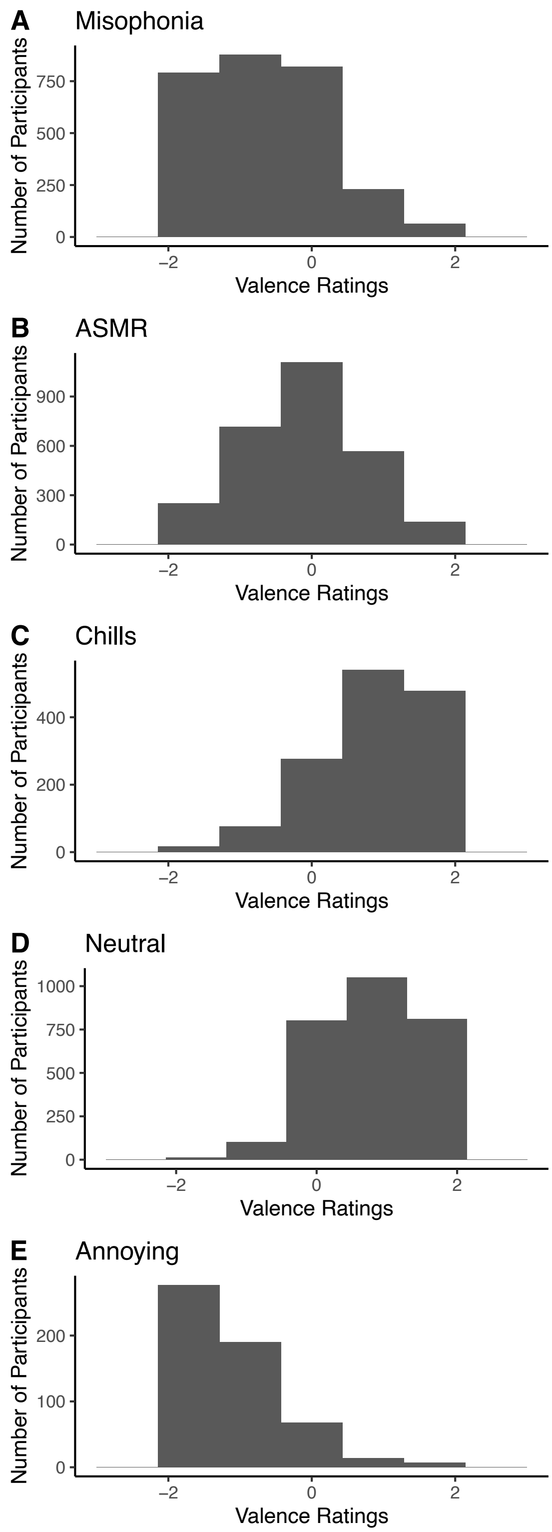
A
Misophonia
Number of Participants
750
500
250
0
−2
0
2
Valence Ratings
B
ASMR
Number of Participants
900
600
300
0
−2
0
2
Valence Ratings
C
Chills
Number of Participants
400
200
0
−2
0
2
Valence Ratings
D
Neutral
Number of Participants
1000
750
500
250
0
−2
0
2
Valence Ratings
E
Annoying
Number of Participants
200
100
0
−2
0
2
Valence Ratings

Figure 2

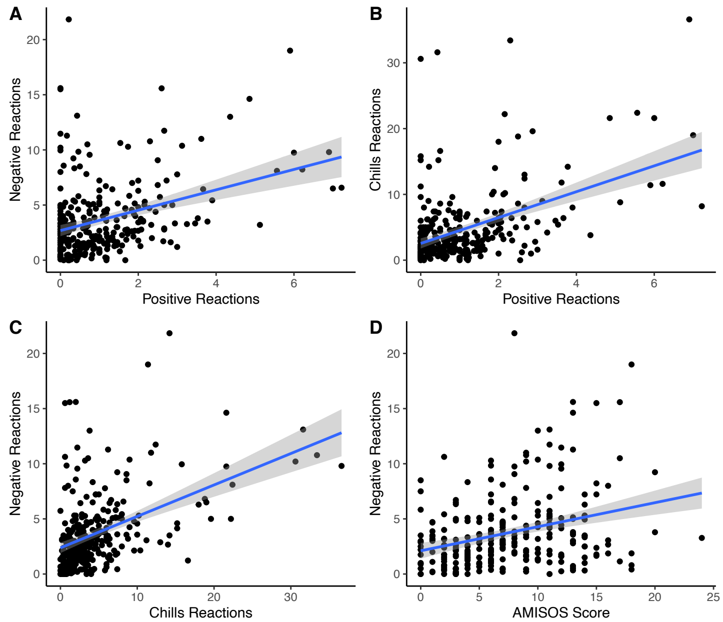
A
Negative Reactions
Positive Reactions
B
Chills Reactions
Positive Reactions
C
Negative Reactions
Chills Reactions
D
Negative Reactions
AMISOS Score

Figure 3

Table 1. Participant demographics.

	Full Sample	
	n	%
Age		
Mean	30.7	100
Standard Deviation	13.3	100
Gender		
Male	93	33.5
Female	166	59.7
Non-binary	7	2.5
Gender-fluid	3	1.1
Agender	4	1.4
Other	2	0.7
Prefer not to respond	3	1.1
Current Country		
United States	209	75.2
Canada	23	8.3
Other	46	16.5
Native Language		
English	213	76.6
Other	65	23.4
Musical Experience		
Two or Less Years of Formal Training	159	57.2
Three or More Years of Formal Training	119	42.8

Table S1. Descriptive Statistics for Video Ratings and Correlations of Valence, Arousal, and Reactions for Each Video

Video		**Valence**		**Arousal**		***r***	***r***	***r***
Condition	Description	*M*	*SD*	*M*	*SD*	Valence, Arousal	Valence, Reactions	Arousal, Reactions
Misophonia	*Fork on Plate*	-1.4	.67	1.4	.86	-.38	-.18	.19
	Coughing	-1.4	.68	.95	.91	-.47	-.23	.26
	Snoring	-1.2	.77	.78	.88	-.41	-.21	.25
	Lip Smacking	-1.0	1.0	.84	.91	-.58	-.33	.39
	Ice Crunching	-.90	.91	.69	.86	-.52	-.42	.44
	Gulping	-.63	.86	.50	.80	-.43	-.41	.40
	Slurping	-.47	1.0	.45	.84	-.49	-.29	.40
	Dogs Lapping	-.18	1.1	.34	.89	-.46	-.40	.39
	Heavy Breathing	-.07	.86	.09	.81	-.66	-.24	.26
	Hand Washing	.00	.74	.05	.64	-.57	-.06	.14
ASMR	*Paper Towel Crinkle*	-.32	.90	.23	.83	-.45	-.21	.35
	Foam Pressing	-.32	.97	.29	.81	-.47	-.25	.31
	Nail Tapping	-.29	1.1	.31	1.0	-.60	-.27	.28
	Ribbon Crinkling	-.21	.83	.15	.76	-.45	-.02	.17
	Finger Fluttering	-.21	1.1	.14	.86	-.45	-.11	.19
	Metal Tin Tapping	-.14	1.0	.28	.86	-.44	-.16	.20
	Hair Brushing	-.13	.93	.13	.81	-.34	-.08	.11
	Make-up Brush	-.02	.92	.09	.79	-.45	-.10	.26
	Fur Scratching	.13	.99	.01	.92	-.53	-.19	.32
	Foil Wood Rolling	.15	1.1	.14	.96	-.44	-.14	.16
Neutral	*City*	.14	.68	-.08	.72	-.34	-.14	.27
	Restaurant	.42	.75	-.30	.78	-.47	-.11	.15
	Owl	.75	.81	-.39	.85	-.50	-.01	.11
	Thunderstorm	.96	.86	-.57	1.1	-.47	.11	.15
	Fire Crackling	.97	.75	-.77	.91	-.56	.05	.16
	Jungle	1.1	.86	-.81	.99	-.54	-.06	.08
	Wind Blowing	1.1	.82	-.88	.98	-.56	-.07	.10
	Bird Song	1.1	.79	-.72	.97	-.45	.15	.13
	Tree	1.2	.82	-.91	.99	-.49	.02	.11
	Waves	1.3	.82	-.89	1.1	-.47	.06	.22
Chills	*A Star is Born*	.87	.91	.18	1.03	.03	.26	.25
	Listen	.90	.99	.56	.99	.29	.09	.30
	Bohemian Rhapsody	1.0	.95	.36	1.1	.09	.18	.23
	Nessun Dorma	1.0	.98	.60	1.1	.22	.22	.32
	Oogway Ascends	1.2	.80	.07	1.2	.03	.09	.17
Annoying	*Nails on Chalkboard*	-1.4	.75	1.1	.86	-.51	-.29	.26
	Baby Crying	-1.2	.97	1.0	.88	-.27	-.05	.32

Table S2. A-MISO-S and Video Ratings and Reactions Correlations

	A-MISO-S	Misophonia Reactions	ASMR Reactions	Chills Reactions	Misophonia Valence	ASMR Valence	Chills Valence	Misophonia Arousal	ASMR Arousal
A-MISO-S									
Pearson's r									
BF_{10}									
Misophonia Reactions									
Pearson's r	.34***								
BF_{10}	974340.47								
ASMR Reactions									
Pearson's r	.26***	.53***							
BF_{10}	1145.60	4.16×10^{18}							
Chills Reactions									
Pearson's r	.16*	.45***	.40***						
BF_{10}	3.12	3.29×10^{12}	3.12×10^{9}						
Misophonia Valence									
Pearson's r	-.28***	-.31***	-.15	-.08					
BF_{10}	4988.95	74070.18	1.45	0.17					
ASMR Valence									
Pearson's r	-.18*	-.10	-.19**	-.01##	.40***				
BF_{10}	5.42	0.29	10.12	0.08	2.33×10^{9}				
Chills Valence									
Pearson's r	-.06#	-.02##	.07#	.11	.12	.10			
BF_{10}	0.12	0.08	0.15	0.43	0.62	0.27			
Misophonia Arousal									
Pearson's r	.41***	.35***	.24***	.11	-.57***	-.20**	-.04		
BF_{10}	5.66×10^{9}	4.09×10^{6}	209.95	0.40	3.30×10^{22}	18.81	0.10		
ASMR Arousal									
Pearson's r	.26***	.13	.32***	.13	-.18*	-.56***	-.09	.40***	
BF_{10}	1229.78	0.86	227914.89	0.77	6.70	6.22×10^{20}	0.22	1.69×10^{9}	
Chills Arousal									
Pearson's r	.14	.12	.05#	.28***	.06#	.02##	.10	.07	.11
BF_{10}	1.058	0.59	0.11	4298	0.12	0.08	0.32	0.14	0.35

Note. * $BF_{10}>3$ ** $BF_{10}>10$ *** $BF_{10}>30$ # $BF_{01}>3$ ## $BF_{01}>10$

Table S3. Gold-MSI and (Lack of) Video Ratings and Reactions Correlations

	Gold-MSI	Emotional Engagement
A-MISO-S		
Pearson's r	-.00##	.04##
BF_{01}	13.32	10.85
Misophonia Reactions		
Pearson's r	.07#	.10#
BF_{01}	6.75	3.44
ASMR Reactions		
Pearson's r	-.09#	-.00##
BF_{01}	3.94	13.30
Chills Reactions		
Pearson's r	.15	.19
BF_{01}	0.50	0.11
Misophonia Valence		
Pearson's r	.06#	-.02##
BF_{01}	7.95	12.28
ASMR Valence		
Pearson's r	-.03##	.05#
BF_{01}	11.98	9.79
Chills Valence		
Pearson's r	.17	.31***
BF_{01}	0.21	1.85×10^{-5}
Misophonia Arousal		
Pearson's r	-.06#	.04##
BF_{01}	8.73	10.52
ASMR Arousal		
Pearson's r	-.01##	-.05#
BF_{01}	13.02	9.40
Chills Arousal		
Pearson's r	.12	.16
BF_{01}	1.94	0.31

Note. # $BF_{01}>3$ ## $BF_{01}>10$ *** $BF_{10}>30$

Table S4. Regression Models Predicting Misophonia Video Reactions

Models	P(M)	P(M|data)	BF_M	BF_{10}	R^2
Null model	0.167	7.104×10^{-29}	3.552×10^{-28}	1.000	.000
Misophonia Valence + Misophonia Arousal + ASMR Reactions + Chills Reactions + A-MISO-S	0.167	0.665	9.934	9.364×10^{27}	.427
Misophonia Valence + ASMR Reactions + Chills Reactions + A-MISO-S	0.033	0.197	7.116	1.387×10^{28}	.420
Misophonia Valence + Misophonia Arousal + ASMR Reactions + Chills Reactions	0.033	0.076	2.369	5.315×10^{27}	.416
Misophonia Arousal + ASMR Reactions + Chills Reactions + A-MISO-S	0.033	0.040	1.199	2.794×10^{27}	.413
Misophonia Valence + ASMR Reactions + Chills Reactions	0.017	0.013	0.780	1.838×10^{27}	.402
Misophonia Arousal + ASMR Reactions + Chills Reactions	0.017	0.009	0.550	1.301×10^{27}	.401
ASMR Reactions + Chills Reactions + A-MISO-S	0.017	2.842×10^{-4}	0.017	4.001×10^{25}	.385
ASMR Reactions + Chills Reactions	0.017	1.395×10^{-6}	8.231×10^{-5}	1.964×10^{23}	.350
Misophonia Valence + Misophonia Arousal + ASMR Reactions + A-MISO-S	0.033	1.307×10^{-6}	3.791×10^{-5}	9.202×10^{22}	.366

Note. Table displays only a subset of models. P(M) is probability of each model. P(M|data) is probability of the model given the observed data. BF_M indicates the how much the odds in favor of the model increased after observing the data. BF_{10} is Bayes Factor showing how much better this model predicts the data compared to the null model. R^2 is the total amount of variance accounted for by the model.

Table S5. Regression Predictors of Misophonia Videos Reactions

Predictor	P(incl)	P(excl)	P(incl|data)	P(excl|data)	$BF_{inclusion}$	Mean	SD	95% Credible Interval Lower	95% Credible Interval Upper
Intercept	1.000	0.000	1.000	0.000	1.000	3.127	0.154	2.844	3.422
Misophonia Valence	0.500	0.500	0.951	0.049	19.314	-1.058	0.479	-1.769	0.000
Misophonia Arousal	0.500	0.500	0.790	0.210	3.754	0.615	0.496	-0.022	1.521
ASMR Reactions	0.500	0.500	1.000	2.893×10^{-9}	3.456×10^{8}	0.635	0.097	0.451	0.818
Chills Reactions	0.500	0.500	1.000	3.222×10^{-6}	310372.871	0.162	0.030	0.105	0.220
A-MISO-S	0.500	0.500	0.902	0.098	9.224	0.077	0.043	0.000	0.146

Note. Table displays aggregated probabilities across all possible models. P(incl) and P(excl) are the probability of each predictor being included or excluded in a model, respectively, before considering the data, whereas P(incl|data) and P(excl|data) are these probabilities after considering the data. $BF_{inclusion}$ represents the odds of being included after considering data divided by the odds of being included before considering the data. The mean, *SD*, and 95% credible interval refer to the values of the unstandardized parameter. Predictors with credible intervals that exclude zero are likely to be retained in the best model.

Table S6. Regression Models Predicting ASMR Video Reactions

Models	P(M)	P(M|data)	BF_M	BF_{10}	R^2
Null model	0.167	1.684×10^{-24}	8.418×10^{-24}	1.000	.000
Chills Reactions + ASMR Arousal + Misophonia Reactions	0.017	0.528	65.893	3.134×10^{24}	.373
Chills Reactions + A-MISO-S + ASMR Arousal + Misophonia Reactions	0.033	0.171	6.001	5.092×10^{23}	.374
Chills Reactions + ASMR Valence + ASMR Arousal + Misophonia Reactions	0.033	0.146	4.971	4.346×10^{23}	.373
Chills Reactions + A-MISO-S + ASMR Valence + ASMR Arousal + Misophonia Reactions	0.167	0.134	0.772	7.946×10^{22}	.374
ASMR Arousal + Misophonia Reactions	0.017	0.016	0.937	9.284×10^{22}	.346
A-MISO-S + ASMR Arousal + Misophonia Reactions	0.017	0.002	0.132	1.322×10^{22}	.347
ASMR Valence + ASMR Arousal + Misophonia Reactions	0.017	0.002	0.111	1.113×10^{22}	.346
A-MISO-S + ASMR Valence + ASMR Arousal + Misophonia Reactions	0.033	6.291×10^{-4}	0.018	1.868×10^{21}	.347
Chills Reactions + ASMR Valence + Misophonia Reactions	0.017	2.556×10^{-4}	0.015	1.518×10^{21}	.337

Note. Table displays only a subset of models. P(M) is probability of each model. P(M|data) is probability of the model given the observed data. BF_M indicates the how much the odds in favor of the model increased after observing the data. BF_{10} is Bayes Factor showing how much better this model predicts the data compared to the null model. R^2 is the total amount of variance accounted for by the model.

Table S7. Regression Predictors of ASMR Videos Reactions

Predictor	P(incl)	P(excl)	P(incl|data)	P(excl|data)	$BF_{inclusion}$	Mean	SD	95% Credible Interval Lower	Upper
Intercept	1.000	0.000	1.000	0.000	1.000	1.740	0.086	1.562	1.898
Chills Reactions	0.500	0.500	0.980	0.020	48.107	0.058	0.019	0.022	0.097
A-MISO-S	0.500	0.500	0.308	0.692	0.446	0.004	0.012	-0.010	0.039
ASMR Valence	0.500	0.500	0.283	0.717	0.395	-0.010	0.081	-0.275	0.131
ASMR Arousal	0.500	0.500	1.000	4.769×10^{-4}	2095.830	0.718	0.160	0.408	1.030
Misophonia Reactions	0.500	0.500	1.000	8.694×10^{-11}	1.150×10^{10}	0.217	0.030	0.159	0.275

Note. Table displays aggregated probabilities across all possible models. P(incl) and P(excl) are the probability of each predictor being included or excluded in a model, respectively, before considering the data, whereas P(incl|data) and P(excl|data) are these probabilities after considering the data. $BF_{inclusion}$ represents the odds of being included after considering data divided by the odds of being included before considering the data. The mean, *SD*, and 95% credible interval refer to the values of the unstandardized parameter. Predictors with credible intervals that exclude zero are likely to be retained in the best model.

Table S8. Regression Models Predicting Chills Video Reactions

Models	P(M)	P(M|data)	BF_M	BF_{10}	R^2
Null model	0.167	8.643×10^{-18}	4.322×10^{-17}	1.000	.000
Frisson Arousal + ASMR Reactions + Misophonia Reactions	0.017	0.298	25.032	3.446×10^{17}	.294
Frisson Valence + Frisson Arousal + ASMR Reactions + Misophonia Reactions	0.033	0.297	12.236	1.717×10^{17}	.300
A-MISO-S + Frisson Valence + Frisson Arousal + ASMR Reactions + Misophonia Reactions	0.167	0.290	2.044	3.357×10^{16}	.300
A-MISO-S + Frisson Arousal + ASMR Reactions + Misophonia Reactions	0.033	0.111	3.618	6.417×10^{16}	.295
Frisson Arousal + Misophonia Reactions	0.017	0.002	0.103	2.023×10^{15}	.255
Frisson Valence + Frisson Arousal + Misophonia Reactions	0.017	0.001	0.081	1.580×10^{15}	.264
A-MISO-S + Frisson Valence + Frisson Arousal + Misophonia Reactions	0.033	4.469×10^{-4}	0.013	2.585×10^{14}	.264
A-MISO-S + Frisson Arousal + Misophonia Reactions	0.017	2.517×10^{-4}	0.015	2.913×10^{14}	.255
ASMR Reactions + Misophonia Reactions	0.017	1.846×10^{-4}	0.011	2.136×10^{14}	.242

Note. Table displays only a subset of models. P(M) is probability of each model. P(M|data) is probability of the model given the observed data. BF_M indicates the how much the odds in favor of the model increased after observing the data. BF_{10} is Bayes Factor showing how much better this model predicts the data compared to the null model. R^2 is the total amount of variance accounted for by the model.

Table S9. Regression Predictors of Chills Videos Reactions

Predictor	P(incl)	P(excl)	P(incl|data)	P(excl|data)	$BF_{inclusion}$	Mean	SD	95% Credible Interval	
								Lower	Upper
Intercept	1.000	0.000	1.000	0.000	1.000	4.732	0.277	4.157	5.236
A-MISO-S	0.500	0.500	0.402	0.598	0.672	-0.013	0.042	-0.127	0.060
Frisson Valence	0.500	0.500	0.589	0.411	1.433	0.400	0.480	-0.082	1.474
Frisson Arousal	0.500	0.500	1.000	4.503×10^{-4}	2219.719	1.529	0.359	0.823	2.202
ASMR Reactions	0.500	0.500	0.996	0.004	260.637	0.670	0.185	0.310	1.018
Misophonia Reactions	0.500	0.500	1.000	2.914×10^{-5}	34310.472	0.488	0.099	0.282	0.674

Note. Table displays aggregated probabilities across all possible models. P(incl) and P(excl) are the probability of each predictor being included or excluded in a model, respectively, before considering the data, whereas P(incl|data) and P(excl|data) are these probabilities after considering the data. $BF_{inclusion}$ represents the odds of being included after considering data divided by the odds of being included before considering the data. The mean, *SD*, and 95% credible interval refer to the values of the unstandardized parameter. Predictors with credible intervals that exclude zero are likely to be retained in the best model.

Table S10. A-MISO-S and Recoded Video Ratings and Reactions Correlations

	A-MISO-S	Negative Reactions	Positive Reactions	Chills Reactions	Negative Arousal	Positive Arousal
A-MISO-S						
Pearson's r						
BF_{10}						
Negative Reactions						
Pearson's r	.30***					
BF_{10}	38789.07					
Positive Reactions						
Pearson's r	.11	.35***				
BF_{10}	0.43	4.31×10^{6}				
Chills Reactions						
Pearson's r	.16*	.46***	.46***			
BF_{10}	3.12	5.41×10^{12}	2.05×10^{13}			
Negative Arousal						
Pearson's r	.32***	.26***	-.02##	.13#		
BF_{10}	171601.22	1057.87	0.08	0.91		
Positive Arousal						
Pearson's r	-.02##	-.02##	.33***	.08#	-.24***	
BF_{10}	0.08	0.08	516554.25	0.19	269.04	
Chills Arousal						
Pearson's r	.14	.16	.10	.28***	.01##	.29***
BF_{10}	1.06	2.53	0.29	4298.00	0.08	7082.22

Note. * $BF_{10}>3$ ** $BF_{10}>10$ *** $BF_{10}>30$ # $BF_{10}>3$ ## $BF_{10}>10$

Table S11. Gold-MSI and (Lack of) Recoded Video Ratings and Reactions Correlations

	Gold-MSI	**Emotional Engagement**
Negative Reactions		
Pearson's r	.04##	.07#
BF_{01}	10.14	7.28
Positive Reactions		
Pearson's r	.02##	.08#
BF_{01}	12.55	4.69
Negative Arousal		
Pearson's r	-.01##	.09#
BF_{01}	13.26	4.80
Positive Arousal		
Pearson's r	-.02##	-.02##
BF_{01}	12.7	12.65

Note. # $BF_{01}>3$ ## $BF_{01}>10$

Table S12. Regression Models Predicting Negative Valence Video Reactions

Models	P(M)	P(M|data)	BF_M	BF_{10}	R^2
Null model	0.200	1.576×10^{-18}	6.304×10^{-18}	1.000	0.000
A-MISO-S + Positive Reactions + Negative arousal + Chills Reactions	0.200	0.953	81.434	6.048×10^{17}	0.310
A-MISO-S + Positive Reactions + Chills Reactions	0.050	0.028	0.553	7.177×10^{16}	0.289
A-MISO-S + Negative arousal + Chills Reactions	0.050	0.011	0.221	2.913×10^{16}	0.284
Positive Reactions + Negative Arousal + Chills Reactions	0.050	0.004	0.081	1.080×10^{16}	0.278
A-MISO-S + Chills Reactions	0.033	0.003	0.079	1.035×10^{16}	0.267
Negative Arousal + Chills Reactions	0.033	7.957×10^{-5}	0.002	3.029×10^{14}	0.247
Positive Reactions + Chills Reactions	0.033	6.812×10^{-6}	1.975×10^{-4}	2.593×10^{13}	0.233
A-MISO-S + Positive Reactions + Negative Arousal	0.050	1.675×10^{-6}	3.183×10^{-5}	4.252×10^{12}	0.234
Chills Reactions	0.050	1.303×10^{-6}	2.476×10^{-5}	3.307×10^{12}	0.209

Note. Table displays only a subset of models. P(M) is probability of each model. P(M|data) is probability of the model given the observed data. BF_M indicates the how much the odds in favor of the model increased after observing the data. BF_{10} is Bayes Factor showing how much better this model predicts the data compared to the null model. R^2 is the total amount of variance accounted for by the model.

Table S13. Regression Predictors of Negative Valence Video Reactions

Predictor	P(incl)	P(excl)	P(incl|data)	P(excl|data)	$BF_{inclusion}$	Mean	SD	95% Credible Interval Lower	95% Credible Interval Upper
Intercept	1.000	0.000	1.000	0.000	1.000	3.738	0.173	3.385	4.051
A-MISO-S	0.500	0.500	0.996	0.004	229.162	0.134	0.040	0.056	0.214
Positive Reactions	0.500	0.500	0.986	0.014	69.049	0.462	0.158	0.170	0.787
Negative Arousal	0.500	0.500	0.969	0.031	31.253	0.909	0.364	0.000	1.450
Chills Reactions	0.500	0.500	1.000	1.709×10^{-6}	584991.500	0.193	0.036	0.120	0.262

Note. Table displays aggregated probabilities across all possible models. P(incl) and P(excl) are the probability of each predictor being included or excluded in a model, respectively, before considering the data, whereas P(incl|data) and P(excl|data) are these probabilities after considering the data. $BF_{inclusion}$ represents the odds of being included after considering data divided by the odds of being included before considering the data. The mean, *SD*, and 95% credible interval refer to the values of the unstandardized parameter. Predictors with credible intervals that exclude zero are likely to be retained in the best model.

Table S14 Regression Models Predicting Positive Valence Video Reactions

Models	P(M)	P(M|data)	BF_M	BF_{10}	R^2
Null model	0.200	4.377×10^{-21}	1.751×10^{-20}	1.000	0.000
Negative reactions + Positive Arousal + Chills Reactions	0.050	0.627	31.940	5.730×10^{20}	0.336
A-MISO-S + Negative Reactions + Positive Arousal + Chills Reactions	0.200	0.362	2.273	8.277×10^{19}	0.336
Positive Arousal + Chills Reactions	0.033	0.008	0.240	1.124×10^{19}	0.305
A-MISO-S + Positive Arousal + Chills Reactions	0.050	0.002	0.047	2.244×10^{18}	0.307
Negative Reactions + Chills Reactions	0.033	9.500×10^{-8}	2.755×10^{-6}	1.302×10^{14}	0.242
Negative Reactions + Positive Arousal	0.033	5.115×10^{-8}	1.483×10^{-6}	7.011×10^{13}	0.239
A-MISO-S + Negative Reactions + Chills Reactions	0.050	2.083×10^{-8}	3.958×10^{-7}	1.904×10^{13}	0.243
Chills Reactions	0.050	1.846×10^{-8}	3.507×10^{-7}	1.687×10^{13}	0.218
A-MISO-S + Negative reactions + Positive arousal	0.050	1.138×10^{-8}	2.162×10^{-7}	1.040×10^{13}	0.239

Note. Table displays only a subset of models. P(M) is probability of each model. P(M|data) is probability of the model given the observed data. BF_M indicates the how much the odds in favor of the model increased after observing the data. BF_{10} is Bayes Factor showing how much better this model predicts the data compared to the null model. R^2 is the total amount of variance accounted for by the model.

Table S15. Regression Predictors of Positive Valence Video Reactions

Predictor	P(incl)	P(excl)	P(incl|data)	P(excl|data)	$BF_{inclusion}$	Mean	SD	95% Credible Interval Lower	95% Credible Interval Upper
Intercept	1.000	0.000	1.000	0.000	1.000	1.141	0.065	1.020	1.269
A-MISO-S	0.500	0.500	0.365	0.635	0.574	6.207×10^{-5}	0.009	-0.019	0.021
Negative Reactions	0.500	0.500	0.989	0.011	92.864	0.073	0.023	0.033	0.121
Positive Arousal	0.500	0.500	1.000	1.362×10^{-7}	7.345×10^{6}	0.585	0.096	0.385	0.758
Chills Reactions	0.500	0.500	1.000	6.252×10^{-8}	1.599×10^{7}	0.082	0.013	0.058	0.110

Note. Table displays aggregated probabilities across all possible models. P(incl) and P(excl) are the probability of each predictor being included or excluded in a model, respectively, before considering the data, whereas P(incl|data) and P(excl|data) are these probabilities after considering the data. $BF_{inclusion}$ represents the odds of being included after considering data divided by the odds of being included before considering the data. The mean, *SD*, and 95% credible interval refer to the values of the unstandardized parameter. Predictors with credible intervals that exclude zero are likely to be retained in the best model.