Systematic Review Article

Frisson and ASMR as Related Sensory-Emotional Responses: A Systematic Review of Psychophysiological and Neural Mechanisms

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ABSTRACT

Frisson, the involuntary chills-and-goosebumps response to music and other auditory stimuli, is a psychophysiological phenomenon experienced by an estimated majority of listeners, yet its underlying mechanisms remain incompletely understood. This systematic review conducted a structured search of the PubMed and Google Scholar databases to identify seven peer-reviewed studies that met the inclusion criteria for analysis, three addressing frisson directly and four addressing ASMR as indirect comparative evidence. The methodological quality of the included studies was appraised using the Mixed Methods Appraisal Tool (MMAT) and was generally moderate. Results indicate that frisson is a measurable autonomic response associated with increased heart rate, respiration, and muscle activity, and that, in the one study to test both, momentary anxiety predicted frisson intensity whereas trait Openness to Experience did not. Acoustic analyses indicate that spatially dynamic sounds, interaural asymmetry, and low-frequency tonal qualities were associated with frisson, with responses typically peaking approximately two seconds after stimulus change, suggesting higher-order neural processing rather than reflexive activation. Limited neuroimaging evidence, resting in each case on a single small study, indicates that frisson engages reward circuitry, including the ventral striatum at coordinates overlying the nucleus accumbens, alongside reduced amygdala activity. Although frisson and the Autonomous Sensory Meridian Response (ASMR) appear to share overlapping neural substrates, the available evidence suggests they diverge in key ways: frisson appears to carry an intrinsic positive affective valence, whereas ASMR is context-dependent and recruits additional social-processing regions. Because most of the comparative evidence derives from ASMR studies, these contrasts are inferred rather than observed in frisson directly. Collectively, and within the limits of a small and heterogeneous evidence base, these findings are most consistent with an interpretation of frisson as a heterogeneous family of related responses arising from the interaction of sensory processing, emotional salience, and reward-system activation, an interpretation that should be regarded as a working hypothesis pending larger and more standardized studies.

Keywords: frisson; aesthetic chills; ASMR; reward system; psychophysiology; auditory stimuli; music and emotion

INTRODUCTION

Frisson refers to the transient, involuntary chills-and-goosebumps response elicited by music and other auditory stimuli, described in earlier work as "musical chills" or "aesthetic chills." It is generally experienced as pleasurable and is commonly reported by listeners; prevalence estimates vary across samples

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and measurement methods but suggest that a substantial majority of individuals have experienced it. Unlike a startle reaction, which is reflexive and typically aversive, frisson is usually pleasurable, although its relationship to pleasure is not invariant.

Frisson is of theoretical interest because it does not map cleanly onto a single psychological category. It has an affective dimension, a measurable peripheral-physiological dimension, and a sensory-perceptual dimension, and it can occur rapidly enough to precede conscious appraisal of the stimulus. Characterizing it therefore requires integrating evidence from psychophysiology, from the acoustics of the eliciting stimulus, and from the neuroscience of reward. Despite growing empirical attention, the mechanisms underlying frisson, and the extent to which it constitutes a single response or several related ones, remain incompletely resolved.

A recurring theme in this literature is the involvement of the brain's reward system. Intensely pleasurable responses to music engage reward-related regions, including the ventral striatum, together with coordinated autonomic changes (1). Frisson is also frequently compared with the Autonomous Sensory Meridian Response (ASMR), a related tingling sensation typically elicited by soft, close-range sounds such as whispering or tapping rather than by music. Because the two phenomena share overlapping neural substrates and predictors (2, 3), ASMR has been used as a comparison condition to distinguish what is specific to musical frisson from what belongs to a broader class of pleasurable sensory responses. Because the empirical literature on frisson itself is small, ASMR studies were included here as indirect comparative evidence rather than as studies of frisson; four of the seven included studies examine ASMR, and the review is therefore framed around both phenomena rather than frisson alone.

Accordingly, this systematic review addresses the following research question: among individuals who experience frisson in response to music and other auditory stimuli, what psychophysiological, acoustic, and neurobiological mechanisms underlie the frisson response, and how do these mechanisms compare with those of the closely related Autonomous Sensory Meridian Response, and what can ASMR research indicate, indirectly, about frisson itself? The objectives of the review are threefold: (1) to characterize the autonomic and individual-difference profile of frisson; (2) to identify the acoustic and sensory properties that reliably elicit it; and (3) to clarify its neural basis and its overlap with, and divergence from, ASMR.

METHODS AND MATERIALS

A systematic literature review was conducted using PubMed and Google Scholar from February 2026 through March 2026 to identify peer-reviewed empirical studies examining the psychophysiological phenomenon of frisson—the pleasurable, chills-like response characterized by goosebumps or tingling sensations elicited by music and other auditory stimuli. Google Scholar was selected for its broad indexing of psychology, neuroscience, music-psychology, and behavioral-science journals, while PubMed provided additional coverage of biomedical and neurological research.

Search strategy

Searches combined controlled vocabulary and free-text terms using Boolean operators. Representative search strings included: ("frisson" OR "aesthetic chills" OR "musical chills" OR "skin orgasm") AND ("music" OR "auditory" OR "sound"); ("frisson" OR "chills") AND ("dopamine" OR "reward" OR "nucleus accumbens"); ("ASMR" OR "autonomous sensory meridian response") AND ("frisson" OR "tingle" OR "chills"); and ("binaural" OR "spatial sound") AND ("frisson" OR "chills"). Additional terms, including "openness to experience," "intensely pleasurable responses to music," and "psychophysiological response to music," were combined with the above using the OR operator to broaden coverage. Reference lists of retrieved articles were also screened for further eligible studies.

Articles were included if they met the following criteria: peer-reviewed empirical research published in academic journals; a focus on frisson, aesthetic chills, or closely related psychophysiological phenomena (including ASMR where neurologically or phenomenologically relevant); examination of the neurological, psychological, or sensory mechanisms underlying the frisson response; use of measurable outcome variables such as brain activity, dopamine release, physiological markers, or self-reported perceptual ratings; and availability in English. Sources were excluded if they did not directly address the neurological or psychological underpinnings of frisson or related chills-inducing phenomena, lacked empirical support for their claims, or were non-peer-reviewed popular articles without primary data.

Study selection

The database search yielded approximately 96 records, which were compiled and de-duplicated (8 duplicates removed). The remaining 88 records were screened by title and abstract against the inclusion and exclusion criteria, of which 70 were excluded. Of the 18 reports sought for full-text retrieval, 1 could not be retrieved; the 17 reports assessed for eligibility yielded 10 exclusions (4 did not address frisson mechanisms, 4 lacked empirical or primary data, and 2 were not peer-reviewed), leaving seven studies for inclusion (Figure 1; Table 1). Screening and eligibility decisions were carried out by the author against the predefined criteria; the single-reviewer nature of this process is acknowledged as a limitation.

Quality assessment

The methodological quality of each included study was appraised using the Mixed Methods Appraisal Tool (MMAT, 2018 version), which accommodates the range of quantitative and mixed-methods designs represented in the evidence base. Each study was evaluated against the MMAT screening questions and the criteria relevant to its design category (quantitative descriptive, quantitative non-randomized, or mixed methods) and assigned an overall rating according to the proportion of the five design-specific criteria satisfied: high (5 of 5), moderate (3 or 4 of 5), or low (2 or fewer of 5). Both MMAT screening questions had to be answered affirmatively before full appraisal proceeded. Criterion-level judgements for every study are reported in Table 3 so that the overall ratings can be verified independently. The results of this appraisal are reported in the Results and summarized in Tables 2 and 3.

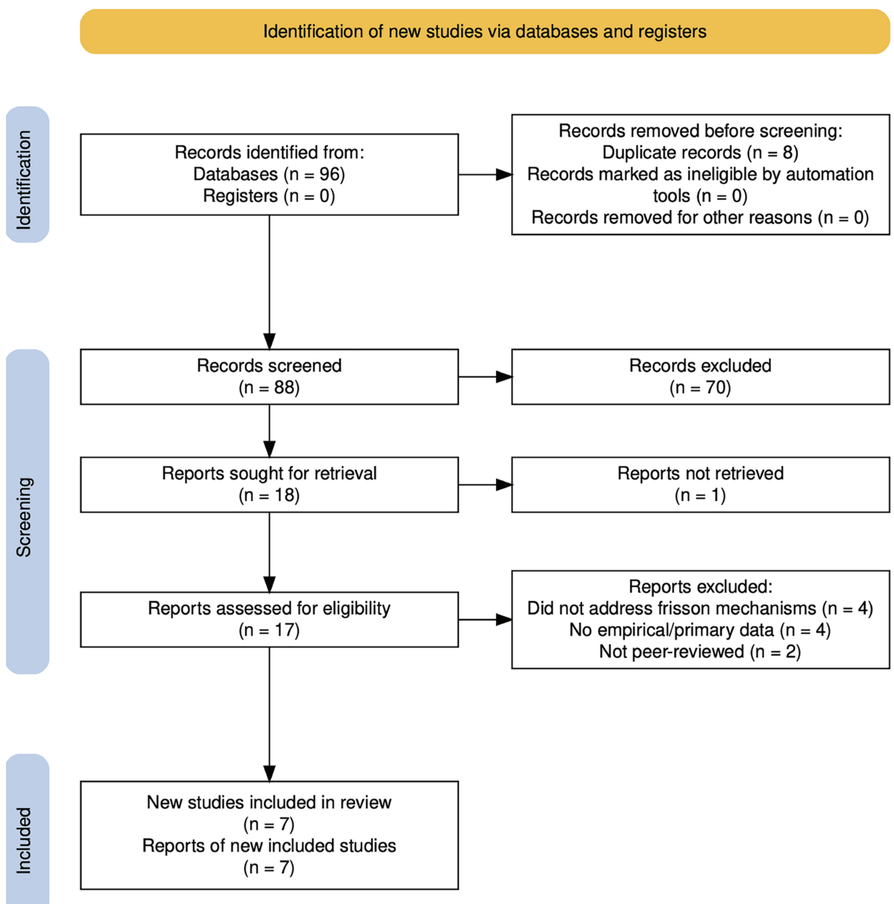

Figure 1. *PRISMA 2020 flow diagram of study identification, screening, and inclusion. Of 96 records identified through database searching (PubMed and Google Scholar) and 0 through registers, 8 duplicates were removed before screening. The remaining 88 records were screened by title and abstract, and 70 were excluded. Of 18 reports sought for retrieval, 1 could not be retrieved; the 17 reports assessed for full-text eligibility yielded 10 exclusions (4 did not address frisson mechanisms, 4 lacked empirical or primary data, and 2 were not peer-reviewed). Seven studies met all criteria and were included in the review.*

***Table 1**. For each included report, the table lists the study sample (size and population), the thematic category under which it is synthesized in the Results, and the principal findings relevant to the frisson response. Bracketed numbers correspond to the reference list.*

Reports	Sample (Size and Population)	Category	Relevant Results
Blood & Zatorre, 2001 (1)	10 McGill University students (ages 20–30) with at least 8 years of music training	Psychophysiological Characteristics	Frisson produces measurable increases in heart rate, muscle tension, and breathing. Chills occurred during 77% of personally chosen music scans and not once during control music scans. Frisson engages the ventral striatum (peak coordinates overlying the nucleus accumbens) and related reward regions, while amygdala activity decreases– the same reward circuitry engaged by food, sex, and drug use.
Honda *et al*., 2020 (5)	19 healthy university students (ages 18–21) with normal hearing	Acoustic and Sensory Factors for Frisson	Spatially moving sounds (especially rotating binaural audio) produce significantly more frisson than stationary sounds. The key predictor is interaural volume asymmetry– the greater the difference between what each ear receives, the stronger the frisson. Rotating sounds increased frisson but decreased rated pleasantness, which the authors interpret as a possible warning-signal response. No significant association was found between frisson and measured anxiety or impulsivity.
Koumura *et al*., 2021 (4)	40 right-handed Japanese college students with normal hearing across two experiments (10 in Experiment 1, 30 in Experiment 2)	Acoustic and Sensory Factors for Frisson	Dark (low-pitched), loud, and compact (narrow frequency range) sounds are the most reliable frisson triggers. Frisson consistently peaks ~2 seconds after a sound change, ruling out a startle reflex. Frisson is stronger with proximate, intimate sounds than simply loud ones. Individual frisson patterns are highly consistent within a person across sessions (r = .87). Momentary anxiety (POMS Tension-Anxiety) accounted for 27.2% of between-participant variance in frisson intensity, whereas trait Openness to Experience did not predict it. Frisson was reported mainly at the ears, neck, shoulders, and spine.
Leung & Romano, 2024 (7)	180 English-speaking adults recruited from ASMR Reddit communities (ages 18–55)	Neurobiological Correlates and the ASMR–Frisson Overlap	ASMR tingling intensity remains consistent across different emotional contexts (fear-primed vs. relaxed), but the emotional experience surrounding it changes. ASMR amplifies pre-existing emotional states rather than generating its own fixed emotional charge– a key contrast to frisson, which carries an intrinsic positive valence.
Lochte *et al*., 2018 (2)	10 ASMR-sensitive adults recruited from online ASMR forums who underwent functional magnetic resonance imaging (fMRI) scanning at Dartmouth College	Neurobiological Correlates and the ASMR–Frisson Overlap	ASMR-induced frisson activates the nucleus accumbens, insula, supplementary motor area, and somatosensory cortex, substantially overlapping with music-induced frisson. The medial prefrontal cortex (associated with social processing and intimacy) was active during ASMR, in contrast to the decrease reported for musical frisson in earlier work; the study included no frisson condition.
Roberts *et al*., 2020 (3)	100 first-year psychology students (ages 18+), English-speaking	Neurobiological Correlates and the ASMR–Frisson Overlap	ASMR and musical frisson are statistically linked but weakly correlated. The physical tingling sensations show almost no overlap between the two phenomena; what they share most is a general susceptibility to having one's state of consciousness altered by external sensory stimuli. Earlier work cited by the authors reported that most individuals who have experienced both describe them as qualitatively distinct.

Continued Table 1. *For each included report, the table lists the study sample (size and population), the thematic category under which it is synthesized in the Results, and the principal findings relevant to the frisson response. Bracketed numbers correspond to the reference list.*

Reports	Sample (Size and Population)	Category	Relevant Results
Sakurai *et al*., 2021 (6)	30 healthy adults (ages 20+) who underwent fMRI while listening to ASMR and classical music	Neurobiological Correlates and the ASMR–Frisson Overlap	ASMR and classical music produce equal levels of relaxation even when no tingling is felt. ASMR recruits more brain regions than classical music overall, with significantly stronger medial prefrontal cortex activation. ASMR also activates occipital regions despite being audio-only, which the authors attribute to spatial hearing. No participant reported tingling or frisson.

RESULTS

Psychophysiological Characteristics

Frisson is more than a passing sensation; it is a measurable, physiologically grounded response that varies meaningfully across individuals and contexts. Characterizing its psychophysiological profile requires examining both what occurs in the body during frisson and the factors that determine who experiences it, and how strongly.

One of the most consistent findings across frisson research is that not everyone experiences it equally: some individuals report chills frequently and intensely, whereas others rarely do. The determinants of these differences appear to be context-dependent. For ASMR-type sounds specifically, the strongest predictor of frisson intensity was not personality but the participant's momentary anxiety, measured with the Profile of Mood States Tension-Anxiety subscale, which alone accounted for 27.2% of the variance in frisson intensity between participants (adjusted $R^2 = .245$) (4). Traits like Openness to Experience, which earlier music research had identified as a key factor, did not significantly predict frisson intensity in this context (4). This may be because ASMR sounds engage threat-detection systems more directly than music does, making momentary anxiety a more relevant driver than stable personality traits (4). This account is not uncontested: a separate study using the State-Trait Anxiety Inventory found no significant association between anxiety and frisson ratings (5), so the contribution of transient mood should be treated as unresolved. This suggests that frisson susceptibility is governed not by a single factor but by different factors depending on the eliciting stimulus, with personality establishing a general baseline and momentary mood modulating it.

Beyond individual differences, frisson also produces measurable changes in the body and is not merely a subjective feeling. Heart rate, muscle tension, and breathing all increase noticeably during moments of self-reported chills compared with moments without them, confirming that frisson involves coordinated activity of the autonomic nervous system (1). Frisson also depends on the music being personally meaningful: chills were reported during 77% of scans with personally chosen music but not once during control music scans (1). Even though music was playing throughout, the response appeared only when it mattered to the listener. Frisson patterns have also been shown to be remarkably consistent within each person over time; when the same individual listened to the same sounds in a later session, their frisson responses were closely correlated with those of the first session ($r = .87$) (4). Thus, while the intensity of frisson varies enormously between individuals, each person's own pattern of when and where they feel it remains stable. Together, these findings indicate that frisson is a reliable and measurable phenomenon that is nonetheless highly individual.

Acoustic and Sensory Factors for Frisson

Certain acoustic qualities—how a sound moves through space, how it is distributed between the ears, and how dark or bright its tone is—reliably predict whether frisson will occur, and they do so independently of whether the listener finds the sound beautiful or emotionally significant.

A substantial portion of the research has examined what it is about a sound that makes frisson more or less likely. Across sound types, a consistent pattern emerges: sounds that move spatially—rotating around the listener's head—produce significantly more frisson than sounds that remain in one place, and sounds presented binaurally, with a different signal reaching each ear, produce more frisson than the same material presented monaurally to both ears (5). The speed of rotation makes no difference; what triggers frisson is the movement itself rather than its speed (5). This is an important finding because it shows that the physical path a sound takes through space, not only its pitch or rhythm, can independently elicit frisson.

The specific acoustic qualities most closely associated with frisson have also been examined. The strongest predictor was the difference in volume between the two ears (interaural asymmetry): the greater the difference, the stronger the frisson (5). The brightness or sharpness of a sound also contributes to frisson likelihood across multiple conditions (5). Notably, moments of highest frisson were often also rated as least pleasant, suggesting that frisson and pleasure do not always co-occur (5). This has been interpreted through the idea that sounds moving toward the listener can activate the brain's threat-detection system, so that frisson in this context may function more as a defensive alert than as a reward; this reading is offered tentatively by the study's authors rather than tested directly (5). This differs meaningfully from the frisson elicited by emotionally moving music and raises the possibility that frisson reflects not one mechanism but several overlapping ones, depending on the trigger.

Further investigation into which sound qualities predict frisson has revealed several consistent patterns. Frisson tends to be stronger for louder sounds and weaker for bright, high-pitched sounds; darker, lower-pitched sounds are more reliable triggers (4). The direction of the loudness effect is not consistent across the evidence base, however: the binaural study reported a negative association between loudness and frisson (5). Frisson also decreases when the frequency content of a sound is spread across a wide range, with compact, narrow sounds acting as better triggers (4). These effects have been observed even at low overall volume levels, suggesting that raw loudness is not the key factor; rather, the sense of a sound being close and intimate—right next to the ear—amplifies the response more than its absolute loudness (4).

Frisson also does not occur at the instant a sound changes; rather, it consistently peaks approximately two seconds afterward (4). This delay indicates that neural processing of the sound precedes the physical chill, ruling out a simple startle reflex. In addition, the larger the difference between what each ear receives at any given moment, the stronger the frisson (4), a finding that aligns with earlier work and identifies ear-specific spatial information as a key sensory ingredient in frisson, regardless of stimulus type.

The bodily location of frisson also appears to vary with the type of triggering sound. For ASMR-type sounds, the most commonly reported location is around the ears, followed by the neck and shoulders, and then the spine and back, as reported in post-experiment interviews (4). This differs from earlier reports of music-induced chills, cited by the same authors for comparison, in which chills were most often reported along the arms and spine (4). ASMR-induced frisson appears to radiate outward from the ears—consistent with the stimulation arriving directly through them—whereas musical frisson arises more diffusely across the body (4). This difference may reflect a genuine difference in how the two types of frisson propagate through the nervous system.

Neurobiological Correlates and the ASMR-Frisson Overlap

The neuroscience reviewed here consistently identifies the brain's reward system as central to frisson, while also revealing differences between how frisson and ASMR are instantiated in the brain—differences that help explain why the two experiences feel distinct even when they appear similar.

Brain imaging research indicates that frisson engages some of the brain's most fundamental reward circuits. As chill intensity increases, blood flow increases significantly in the ventral striatum and surrounding reward areas, as well as in regions involved in emotional processing, movement, and attention (1). At the same time, activity decreases in the amygdala, a region heavily involved in processing fear and threat (1). The imaging method used, positron emission tomography, does not permit localisation to the nucleus accumbens specifically, although the peak coordinates reported overlie it (1). That frisson activates the same reward regions that respond to food, sex, and drug use was a landmark finding, because it showed that music can engage the brain's biological reward machinery in a manner comparable to basic survival pleasures. The simultaneous quieting of the amygdala is also significant, as it suggests that the brain may actively suppress its threat-response system at the peak of frisson, which may help explain the intensely positive quality of the experience: the brain appears to simultaneously increase reward activity and reduce aversive processing (1).

The original authors note, however, that the amygdala decrease may relate to anticipation of chills rather than to the chills response itself, and that amygdala activity increases during euphoric states in other work, so this account remains provisional (1).

Further brain imaging work has shown that ASMR-induced frisson activates many of the same regions identified in music-induced frisson, including the nucleus accumbens, the insula, and the supplementary motor area (2). The somatosensory cortex also activates during ASMR tingling, consistent with the view that ASMR involves a simulated sense of touch (2). One important difference stands out, however: the medial prefrontal cortex, a region associated with social thinking and with processing interactions with other people, is more active during ASMR than the level reported for musical frisson in earlier work (2); this is a comparison across studies rather than a within-study contrast, as the study included no frisson condition. This additional social-processing activity may underlie ASMR's distinctive sense of intimacy—the impression that someone is present—which musical frisson typically does not produce even when it is neurologically similar.

Comparisons between ASMR audio and classical music reveal further distinctions in how each engages the brain. ASMR's calming effect does not appear to require the tingle itself: equal levels of relaxation have been reported under both ASMR and classical-music conditions even when no tingling occurred (6). ASMR recruits more brain regions overall than classical music and produces significantly stronger activity in the medial prefrontal cortex, consistent with other neuroimaging work on ASMR (6). ASMR also activates regions associated with visual imagination, although the study's authors attribute this activation to spatial hearing, the localisation of sound sources in space, rather than to visual imagery (6). Taken together, these findings suggest that much of what ASMR does in the brain and body occurs even without the conscious tingling sensation, raising the question of whether the tingle is the primary mechanism or the most noticeable marker of a deeper process.

Behavioral research on how closely ASMR and frisson are related finds that, although the two are statistically linked, the relationship is weaker than might be expected. The correlation between the tendency to experience ASMR and the tendency to experience frisson during music is statistically significant but small (3). The physical tingling sensation shows almost no overlap between the two phenomena, whereas the most overlapping aspect is a general tendency for one's state of consciousness to be shifted by an external stimulus (3). In other words, what frisson and ASMR share is less the specific sensation than a general susceptibility to being deeply affected by sensory experience. Consistent with this, earlier work cited by the same authors reported that most individuals who have experienced both describe them as qualitatively different, suggesting that shared brain circuitry does not entail a shared experience (3).

Research on whether ASMR's emotional character depends on context has produced a striking finding: the intensity of ASMR tingling does not change significantly across emotional contexts, even though the surrounding emotional experience does (7). When preceded by fear-inducing content, ASMR is accompanied by higher arousal, more negative mood, and lower pleasantness; when preceded by relaxing content, it feels calming; yet the tingling itself remains consistent across conditions (7). The ASMR sensation thus appears to amplify whatever emotion the context supplies rather than to generate an emotional character of its own (7). This contrasts with musical frisson, in which the positive feeling and the reward-system activation appear intrinsic to the response rather than borrowed from context. This difference suggests that, although frisson and ASMR overlap in many respects, they diverge in an important one: frisson carries its own affective charge, whereas ASMR takes on the emotional color of its surroundings.

Quality Assessment

Application of the MMAT indicated that the methodological quality of the included evidence was generally moderate (Table 2). Six of the seven studies were rated moderate quality, meeting four of five criteria (1, 3, 4, 5) or three of five (6, 7); the recurring concerns were samples not representative of any broader population, reliance on self-report, and, in two cases, the absence of a control condition. One small neuroimaging study was rated low quality, meeting two of five criteria, owing to the absence of a non-ASMR control condition and incomplete reporting of several regions of interest (2). No study met all five criteria. The strongest study replicated its main effects across two experiments and demonstrated within-person reliability, but drew on a narrow national and age range (4). Across the evidence base, the most common limitations were small sample sizes, homogeneous samples (predominantly university students or self-selected online communities), and heterogeneity in stimuli and outcome measures, all of which temper the strength of the conclusions that can be drawn.

Table 2. *Methodological quality appraisal of the included studies using the Mixed Methods Appraisal Tool (MMAT, 2018). For each study, the table lists the MMAT design category, an overall quality rating reflecting the proportion of criteria met (high, 5 of 5; moderate, 3 or 4 of 5; low, 2 or fewer of 5), and the principal methodological concern informing that rating. Criterion-level judgements are given in Table 3. Bracketed numbers correspond to the reference list.*

Study	MMAT design category	Overall quality rating	Principal concern(s)
Blood & Zatorre, 2001 (1)	Quantitative non-randomized	Moderate	Sample not representative (n = 10, highly trained musicians selected for reliable chills responses)
Honda *et al*., 2020 (5)	Quantitative non-randomized	Moderate	Sample not representative (19 students, single site); single-session design
Koumura *et al*., 2021 (4)	Quantitative non-randomized	Moderate	Sample not representative (narrow national and age range); otherwise strong, with replication across two experiments and demonstrated within-person reliability
Leung & Romano, 2024 (7)	Quantitative non-randomized	Moderate	Sample not representative (self-selected online recruitment); poor reliability of one mood measure (α = .42–.44)
Lochte *et al*., 2018 (2)	Quantitative non-randomized	Low	Sample not representative (n = 10, self-selected); no non-ASMR control condition; incomplete outcome reporting (several ROI results not shown)
Roberts *et al*., 2020 (3)	Mixed methods	Moderate	Sample not representative (first-year psychology students); qualitative coding single-coder for 80% of data
Sakurai *et al*., 2021 (6)	Quantitative non-randomized	Moderate	Sample not representative (n = 30, ASMR-naive students); no control group; outcome of interest not elicited (no participant reported frisson)

Table 3. *Criterion-level MMAT (2018) appraisal of the included studies. S1 and S2 are the two screening questions (is there a clear research question; do the collected data address it). For quantitative non-randomized studies, criteria 1–5 are: participants representative of the target population; appropriate measurements; complete outcome data; confounders accounted for in the design and analysis; exposure occurred as intended. For the mixed-methods study, criteria 1–5 are: adequate rationale for a mixed-methods design; effective integration of the components; adequate interpretation of the integrated outputs; divergences and inconsistencies addressed; adherence to the quality criteria of each tradition. Y = criterion met; N = not met. Overall ratings follow the thresholds stated in the Methods (high, 5 of 5; moderate, 3 or 4 of 5; low, 2 or fewer of 5). Bracketed numbers correspond to the reference list.*

Study	MMAT category	S1	S2	1	2	3	4	5	Criteria met	Overall rating
Blood & Zatorre, 2001 (1)	Quantitative non-randomized	Y	Y	N	Y	Y	Y	Y	4 of 5	Moderate
Honda *et al*., 2020 (5)	Quantitative non-randomized	Y	Y	N	Y	Y	Y	Y	4 of 5	Moderate
Koumura *et al*., 2021 (4)	Quantitative non-randomized	Y	Y	N	Y	Y	Y	Y	4 of 5	Moderate
Leung & Romano, 2024 (7)	Quantitative non-randomized	Y	Y	N	N	Y	Y	Y	3 of 5	Moderate
Lochte *et al*., 2018 (2)	Quantitative non-randomized	Y	Y	N	Y	N	N	Y	2 of 5	Low
Roberts *et al*., 2020 (3)	Mixed methods	Y	Y	Y	Y	Y	Y	N	4 of 5	Moderate
Sakurai *et al*., 2021 (6)	Quantitative non-randomized	Y	Y	N	N	Y	N	Y	3 of 5	Moderate

DISCUSSION

Read across the review's three guiding dimensions, psychophysiological, acoustic, and neurobiological, the included evidence converges on an interpretation of frisson as a heterogeneous set of related responses rather than a single uniform mechanism. This interpretation is advanced here as a hypothesis supported by the current evidence rather than as a settled conclusion, given the limitations of the evidence base discussed below.

The psychophysiological findings position frisson as simultaneously universal in its bodily signature and highly individual in its elicitation. That autonomic engagement is reliable while its triggers depend on traits, momentary states, and personal meaning is consistent with broader accounts of music-induced reward, in which pleasure arises not from acoustic features alone but from their interaction with listener expectation and significance. The observation that momentary anxiety, rather than trait Openness, best predicted responses to ASMR-type stimuli suggests that individual-difference models developed for musical chills may not transfer directly to other classes of chills-inducing stimuli. That a second study using a different anxiety measure found no such association tempers this reading, and indicates that the individual-difference picture is not yet stable.

The acoustic and neurobiological findings can be read as evidence for more than one underlying route. On one hand, engagement of the ventral striatum with concurrent amygdala suppression situates emotionally moving frisson within reward-based frameworks of aesthetic pleasure. On the other hand, the finding that peak frisson can coincide with the lowest pleasantness ratings, and can be driven by approaching, spatially dynamic sounds, is compatible with a competing threat-detection interpretation in which some chills reflect a defensive orienting response rather than reward. These accounts need not be mutually exclusive; they may describe distinct pathways that share a final common physiology, which is the core of the proposed "family of related responses" interpretation.

With respect to ASMR, the reviewed evidence supports a relationship of neural overlap without experiential identity. Shared recruitment of reward and somatosensory regions coexists with divergences, most notably greater medial prefrontal engagement during ASMR and the finding that ASMR's affective character is largely borrowed from context whereas musical frisson appears to carry intrinsic positive valence. The weak behavioral correlation between the two tendencies reinforces the view that shared circuitry need not entail a shared experience. These comparative conclusions rest on an uneven evidence base. Only three of the seven included studies measured frisson directly; the remaining four examined ASMR, and any inference from them to frisson is indirect. The included studies also define the phenomenon differently: one treats frisson as coldness or shivering with no requirement that it be pleasurable, another treats ASMR as a component of frisson, and a third studies intensely pleasurable musical chills. Two of the three direct frisson studies themselves used ASMR-type brushing, tapping, or noise stimuli rather than music, so the boundary between the two phenomena is blurred within the evidence base and not only between studies.

These interpretations must be weighed against the quality and composition of the evidence base. The included studies were generally small and frequently drew on narrow samples (university students or self-selected online ASMR communities); the neuroimaging studies in particular used small samples that limit statistical power and warrant caution about reverse inference; and stimuli and outcome measures varied considerably across studies. The MMAT appraisal (Tables 2 and 3) rated six of seven studies as moderate quality, with the smallest neuroimaging sample rated lower, and no study directly compared frisson and ASMR within the same participants using matched measures. In one included study no participant reported either tingling or frisson, so its findings bear on relaxation rather than on the chills response itself. The possibility of publication bias toward positive findings cannot be excluded. Accordingly, the convergence described above should be regarded as suggestive rather than definitive.

CONCLUSION

Taken together, the reviewed evidence characterizes frisson as a reliable, measurable, and highly individual psychophysiological response that engages reward circuitry and is shaped jointly by stable traits, momentary states, and the acoustic properties of the eliciting stimulus. The evidence is most consistent with the interpretation that frisson is not a single mechanism but a family of related responses activated through partly distinct emotional, spatial, and tonal pathways, though this remains a working hypothesis rather than an established fact.

The comparison with ASMR clarifies what is specific to musical frisson: the two share reward-related circuitry and a general sensitivity to sensory experience, yet differ in social-processing engagement, in the source of their affective valence, and in subjective quality. Shared architecture, in short, does not entail a shared experience.

Several priorities follow for future research. Larger and more demographically diverse samples are needed to move beyond the student and online-community populations that dominate the current evidence. A standardized operational definition of frisson and consistent outcome measures would enable clearer comparison across studies. Direct, within-subject comparisons of frisson and ASMR using matched stimuli and measures would test the overlap-without-identity account more stringently. Finally, longitudinal and multimodal neuroimaging designs, combining, for example, hemodynamic and electrophysiological measures, would help establish the temporal sequence and causal structure linking sensory input, neural reward activation, and the peripheral chill.

That auditory stimuli can reliably produce a measurable and deeply felt bodily response underscores the close coupling between auditory perception and the systems that generate emotion and reward, and marks frisson as a productive model for studying that coupling.

CONFLICT OF INTEREST

The author declares no conflicts of interest related to this work.

REFERENCES

1. Blood A J & Zatorre RJ. Intensely pleasurable responses to music correlate with activity in brain regions implicated in reward and emotion. *Proceedings of the National Academy of Sciences of the United States of America*. 2001; 98 (20): 11818–11823. https://doi.org/10.1073/pnas.191355898
2. Lochte BC, Guillory SA, Richard CAH & Kelley WM. An fMRI investigation of the neural correlates underlying the autonomous sensory meridian response (ASMR). *BioImpacts*. 2018; 8 (4): 295–304. https://doi.org/10.15171/bi.2018.32
3. Roberts N, Beath A & Boag S. A mixed-methods examination of autonomous sensory meridian response: Comparison to frisson. *Consciousness and Cognition*. 2020; 86: 103046. https://doi.org/10.1016/j.concog.2020.103046
4. Koumura T, Nakatani M, Liao H-I & Kondo HM. Dark, loud, and compact sounds induce frisson. *Quarterly Journal of Experimental Psychology*. 2021; 74 (6): 1140–1152. https://doi.org/10.1177/1747021820977174
5. Honda S, Ishikawa Y, Konno R, Imai E, Nomiyama N, Sakurada K, Koumura T, Kondo HM, Furukawa S, Fujii S & Nakatani M. Proximal binaural sound can induce subjective frisson. *Frontiers in Psychology*. 2020; 11: 316. https://doi.org/10.3389/fpsyg.2020.00316
6. Sakurai N, Ohno K, Kasai S, Nagasaka K, Onishi H & Kodama N. Induction of relaxation by autonomous sensory meridian response. *Frontiers in Behavioral Neuroscience*. 2021; 15: 761621. https://doi.org/10.3389/fnbeh.2021.761621
7. Leung WL & Romano DM. Autonomous sensory meridian response as a physically felt signature of positive and negative emotions. *Frontiers in Psychology*. 2024; 15: 1183996. https://doi.org/10.3389/fpsyg.2024.1183996