Psychology of Consciousness: Theory, Research, and Practice

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Autonomous Sensory Meridian Response (ASMR): A PRISMA-Guided Systematic Review

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The present PRISMA-guided article systematically reviews the current state of research on the autonomous sensory meridian response (ASMR). A systematic literature search was conducted in Pubmed, SCOPUS, and Web of Science (last search: March 2022) selecting all studies that conducted quantitative scientific research on the ASMR phenomenon. Fifty-four studies focusing on ASMR were retrieved (total participant number: $n = 11{,}140$). ASMR can be linked to several mental health-related variables (e.g., improved mood) and personality traits (e.g., neuroticism). On the neurobiological level, ASMR has been associated with altered electrophysiological response patterns (tentatively suggesting δ wave decreases), activation of specific brain areas (particularly the anterior cingulate gyrus and movement-related regions), and atypical functional connectivity patterns as well as physiological changes such as heart rate reduction. Future studies should evaluate the link between ASMR and additional psychological constructs, reveal more specific neurobiological outcome patterns and conduct long-term ASMR intervention studies.

Keywords: autonomous sensory meridian response, ASMR videos, relaxation

Supplemental materials: https://doi.org/10.1037/cns0000368.supp

General Background

The phenomenon of autonomous sensory meridian response (ASMR), a tingling sensation occurring especially on the skin of the neck and scalp as a reaction to certain triggers (Barratt & Davis, 2015), has increasingly attracted public attention in recent years, especially via internet platforms such as YouTube or TikTok with individual ASMR-related videos receiving millions of views. As a novel way to relax and create pleasant feelings, ASMR might offer possible mental health-related benefits comparable to benefits that have already been demonstrated for other relaxation-associated techniques (e.g., Mindfulness: Creswell, 2017; Yoga: Field, 2011; Progressive muscle relaxation [PMR]: McCallie et al., 2006; or Autogenic Training [AT]: Seo & Kim, 2019). Even though the ASMR phenomenon has not been scientifically studied in

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The data and code for each previously unpublished study in the article will not be made available by the authors of this article, since they are not the authors of the studies conducted and do not have access to the data themselves. For one preprint, however, the data are included in the article published online (G. Poerio et al., 2022), for the other preprint, the authors must be contacted (Tada et al., 2021). The review was not registered. A review protocol was not prepared.

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detail as yet, the initial evidence available on various ASMR-related topics, offers the opportunity to provide a first systematic overview of the existing scientific research. Unsystematic review articles on the topic of ASMR have already been published (e.g., Ahuja, 2013; Andersen, 2015; Harper, 2020; Niven & Scott, 2021; Reddy & Mohabbat, 2020; N. Smith & Snider, 2019). One of these articles provides a brief, structured overview of the current state of ASMR research (Reddy & Mohabbat, 2020), however, without addressing the various definitions, assessment tools, and interventions related to ASMR research. By contrast, our review will extend this work both in terms of methodology and content: We aim to review the current state of ASMR research systematically and comprehensively. To this end, we will give an overview on definitions and assessment tools of the phenomenon, psychological, neural, and physiological ASMR correlates as well as ASMR interventions according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (Page et al., 2021).

Methodology

Selection Process

A systematic search was conducted by Tobias Lohaus (TL) in March 2022. Three different databases (Pubmed, SCOPUS, and Web of Science) were consulted. The search syntaxes for each database are presented in Box 1. After duplicates were removed from the search results, the first step in the selection process was to screen the titles and abstracts of the articles for a thematic fit (only articles that actually addressed the autonomous sensory meridian response were considered). This screening was done by the first author TL and supported by two master's students that were trained in the application of the screening criteria by TL. In the next step, a full-text evaluation of the remaining articles was carried out, with the senior author Patrizia Thoma (PT) being consulted in cases of uncertainty, for example, if it was not immediately obvious whether an article met the more specific inclusion criteria that will be described in the following paragraph.

Eligibility Criteria

The following inclusion criteria (IC) were selected before conducting the systematic search:

- IC1: The study addressed the autonomous sensory meridian response.
- IC2: Studies that implemented original empirical investigations were included, but overviews, commentaries, letters, keynotes, corrections, or qualitative research were not.
- IC3: Only articles accepted in a scientific journal were considered (the discipline was not specified; psychological articles were included as well as articles from medical or economic fields).
- IC4: Only articles written in English were included.

Data Extraction Process

To obtain an overview of the definitions and assessment tools of the phenomenon, an integrative overview was created through the careful evaluation of the individual ASMR articles. In terms of the other areas covered in this systematic review (psychological, neural, and physiological ASMR correlates and ASMR interventions), authors TL and Sarah C. Schreckenberg (SS) summarized the results associated with

Box 1

Syntax of Applied Search Criteria (ASMR, Autonomous Sensory Meridian Response) in (a) Pubmed, (b) SCOPUS, and (c) Web of Science

(a) ("Autonomous Sensory Meridian Response "[All Fields] *OR* "ASMR" [All Fields])

(b) ("Autonomous Sensory Meridian Response" *OR* "ASMR")

(c) ALL = ("Autonomous Sensory Meridian Response" *OR* "ASMR")

(potentially) ASMR-related outcomes according to the following themes:

- ASMR-related mental health outcomes
- ASMR-related personality outcomes
- ASMR-related cognition outcomes
- Specific ASMR-related brain areas/networks revealed via functional magnetic resonance imaging (fMRI)
- Specific ASMR-related electroencephalography (EEG) outcomes
- Specific ASMR-related physiological outcomes
- Other ASMR-related phenomena and correlates

In addition to the aforementioned outcome domains, data were collected on the following variables:

- The report: author(s), year
- The participants: number, age, gender
- The research design: type of study, conditions, type of ASMR stimuli used
- Intervention (only intervention studies): intervention characteristics in the intervention group (IG) and control group (CG), duration

To assess risk of bias, the Critical Appraisal Checklist for Analytical Cross-Sectional Studies was used (Moola et al., 2017), an eight-item instrument for evaluating the methodological quality of studies offering the possibility to rate "yes," "no," "unclear," or "not applicable" for each item. A small adjustment was made so that the instrument could be used not only for cross-sectional studies but also for almost all other study designs. To this end, Item 3 ("Was the exposure measured in a valid and reliable way?") which cannot be applied to the many studies within the systematic review that do not contain exposure and Item 4 ("Were objective, standard criteria used for measurement of the condition?") which is only designed for patient samples were excluded, facilitating applicability to the rather large number of studies with very different study designs retrieved in this systematic review. The final selection of items included in this review can be found in Supplemental Table S1. In addition to the evaluation of risk of bias, other items were created that assess the quality of the articles written about the studies instead of the methodological quality of the studies themselves. For this purpose, our research team developed five items presented in the Supplemental Table S1 (e.g., "Is the interpretation of the results coherent and plausible?"). The risk of bias items and article quality items were rated by author TL and a member of the research team who was trained with regard to the scoring by TL. For each study, a total quality score was calculated, ranging from 0 to 11, corresponding to the total number of items. The interrater reliability for the total scores determined on the basis of all included studies was .88.

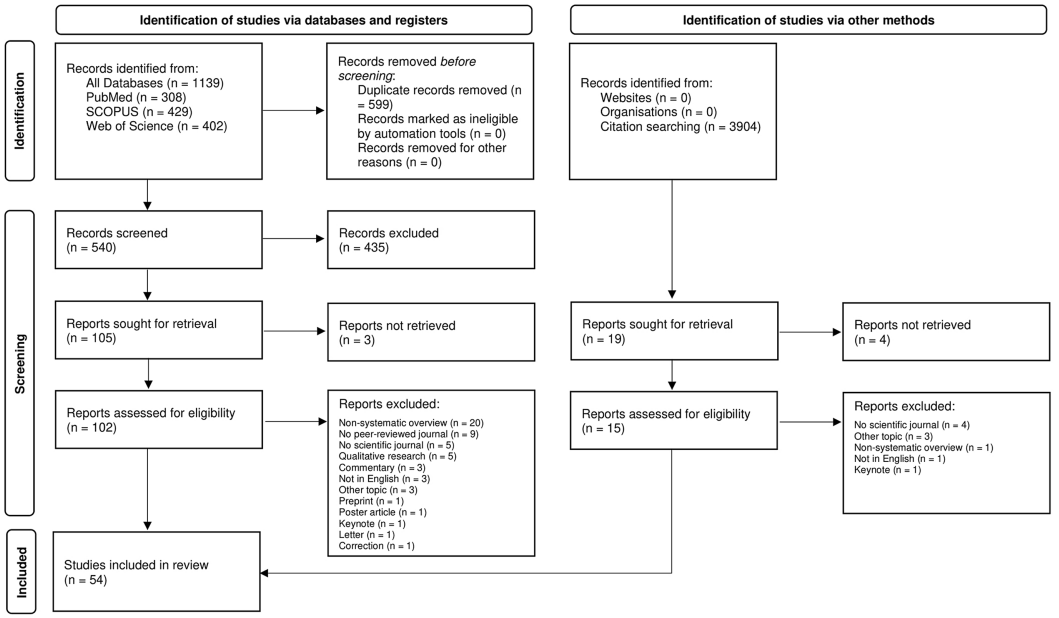
Results

The results of the search and selection process are presented in a flow diagram (Figure 1). Implementing the search syntaxes described above in the three different databases, a total of $n = 1{,}139$ studies were retrieved. Removing duplicates, $n = 540$ records remained that were screened based on the titles and abstracts of the articles. Numerous articles were immediately excluded since ASMR was not mentioned in the title or abstract of the articles (IC 1). $N = 105$ were ultimately assessed in more detail. At the next step, it was a misfit in relation to IC 1–4 that led to exclusion (see Figure 1, for more details). Although the initial search did not restrict whether the research was published in a peer-reviewed journal or whether it was a preprint, we subsequently decided to restrict this criterion so that only peer-reviewed articles and no preprints were included in the final analyses in this review (excluding 10 articles for this reason, 1 preprint and 9 nonpeer-reviewed articles). Ultimately, $n = 49$ articles were included based on the specified screening process. Five articles were additionally included resulting from screening the reference lists of these 49 articles, leading to a total number of $n = 54$ studies. An overview of the data from the individual studies compiled for this review, including the main results of each study, can be found in Table 1.

With regard to the methodological quality of the studies and the articles written about these studies (see Table 2), it is striking that the authors of this article considered the overall quality to be rather inconsistent ($M = 6.93$, $SD = 2.65$, minimum = 0, maximum = 11; based on the rating conducted by author TL). A detailed, critical review of the main findings of this

Figure 1

PRISMA 2020 Flow Diagram for Systematic Search (Conducted in March 2022)



Note. PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

evaluation of the methodological quality of the studies/articles can be found in the discussion in section "3.2. Limitations of Evidence." In the following paragraphs, the findings of the included studies will be summarized and integrated.

Definition and Assessment Tools

ASMR Definition

When it comes to ASMR definitions presented within the 54 assessed articles, the first aspect that stands out is that a large number of articles cite one of the first articles dealing with ASMR on a scientific level, a source by Barratt and Davis (2015). It describes ASMR as a tingling, static-like sensation on the skin that spreads across the skull and the back of the neck and that is accompanied by a feeling of relaxation and well-being.

Given the components of the original definition by Barratt and Davis (2015), it appears that the ASMR phenomenon in general is best described from two different perspectives: On the one hand, when defining ASMR it is possible to describe the sensory perception of ASMR. On the other hand, one can describe what a person feels on an emotional level when experiencing the ASMR phenomenon.

However, further descriptive elements of ASMR are introduced via other definitions. An overview of the different defining components of ASMR that are presented in the articles included in this systematic review is given in Table 3. In terms of the sensory perception, the definition is extended to encompass more body parts than the skull and back of the neck (e.g., spine and peripheral body parts such as arms or limbs) originally focused on by Barratt and Davis (2015). Despite these additions of further body parts, the head and neck are to be regarded as the core areas where the ASMR experience occurs. In terms of the ASMR-related feeling, additional phenomenological descriptions of the ASMR experience can also be found in other definitions provided by the authors of the studies uncovered in this systematic review. For example, in ten cases, a feeling of euphoria is described (Janik McErlean & Banissy, 2017; Keizer et al., 2020; G. L. Poerio et al., 2022; Roberts et al., 2019, 2020a, 2020b, 2021; Rouw & Erfanian, 2018; Seifzadeh et al., 2021; X. Wang et al., 2020). Furthermore, ASMR is described as calming in five cases (Idayati et al., 2021;

Table 1
Detailed Study Overview of the ASMR Articles Included in This Systematic Review

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
A functional magnetic resonance imaging investigation of the autonomous sensory meridian response; S. D. Smith et al. (2019a)	Determining the neural substrates of ASMR	fMRI data, ASMR experience	*34	Three ASMR videos, three videos (4 min per video) including gardening tips, make-up instructions and study suggestions (normal volume speech)/ASMR-responders	ASMR-nonresponders	Whispering, roleplay, hair brushing	Video/12 min	ASMR videos are associated with activation in brain areas related to attention, sensation, and emotion in participants experiencing ASMR
A large-scale study of misophonia; Rouw and Erfanian (2018)	Determining the characteristics of misophonics revealing a link to ASMR	Misophonia, synesthesia, ASMR experience, other disorders	*301, 250f, 51 m, misophonics/ **385	/	/	/	/	49% of misophonics report ASMR
A mixed-methods examination of autonomous sensory meridian response: Comparison to frisson; Roberts et al. (2020a)	(a) Investigating the relationship between ASMR and frisson; (b) examining whether an ASMR questionnaire (ASMR-15) predicts ASMR rating in relation to specific videos	ASMR experience, frisson	*100, 72f, 28 m, undergraduate psychology students	/	/	Whispering, tapping sounds, roleplay, personal attention, positive affirmations, scratching sounds, crunching and chewing sounds, crinkling plastic sounds, jar sounds (and more)	Video/7–35 min	No link between ASMR and frisson, ASMR-15 predicts ASMR video ratings

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
A preliminary compilation of a digital video library on triggering ASMR: A trial among 807 Chinese college students; Liu and Zhou (2019)	Composing a selection of ASMR videos that effectively trigger ASMR	Intensity and frequency of ASMR	*807	ASMR-responders	ASMR-nonresponders	Whispering, tapping, roleplay, personal attention, massage, eating sounds, mouth sounds, ear licking, scratching, brushing (and more)	Video/2–6 min	60 ASMR videos could be determined that reliably trigger ASMR
A study on the human body response to the sound stepping on fallen leaves in ASMR; Ahn (2020)	Sound analysis and effect of a particular ASMR trigger on opinions/feeling and physiological measures	Blood pressure, heartbeat, opinions/feelings about ASMR trigger	*50, —, —, —	/	/	Stepping on fallen leaves	Audio/-	Blood pressure and pulse were normalized after listening to specific ASMR sound (fallen leaves), ASMR sounds were associated with a cool and refreshing feeling
A study on the human sensation of the reed wind sound in ASMR; Ahn et al. (2019)	Sound analysis and effect of a particular ASMR trigger on opinions/feeling and physiological measures	Blood pressure, heartbeat, opinions/feelings about ASMR trigger	*40, —, —, —	/	/	Reed wind sounds	Audio/-	Blood pressure and pulse were normalized after listening to specific ASMR sound (reed wind), ASMR sounds were comforting and relaxing

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
A study on the influence of watching Youtube sound content (ASMR) on youth learning and life; Jeong (2020)	Examining high school students' ASMR usage behavior (1. Figuring out how often and why ASMR is watched, 2. which feelings ASMR is associated with, 3. what the impact of ASMR is on everyday life)	Frequency of ASMR use, reason for watching ASMR, feeling after ASMR use, impact of ASMR on everyday life	*76, —, —, high school students	/	/	/	/	ASMR is frequently watched (less than 5% never watched ASMR); mostly it is used for studying, sleeping and while eating; feelings especially chosen after watching ASMR are "no difference," "mind peace," and "bored"; with regard to positive impact "psychological stability" and "good for studying" were especially chosen
An electroencephalographic examination of the ASMR; B. K. Fredborg et al. (2021)	Examining the neural substrates of ASMR	EEG data, ASMR experience	*28	Two ASMR videos and two ASMR sound audio files, two instructional videos and two instructional audios for growing mushrooms and applying make-up (normal volume speech)/ASMR-responders	ASMR-nonresponders	Whispering, hair brushing, roleplay	Both/—	α wave activity, γ wave activity, and sensorimotor rhythm increased for ASMR-responders (compared to ASMR-nonresponders)

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
An examination of personality traits associated with ASMR; B. Fredborg et al. (2017)	Examining which Big Five personality traits are linked to ASMR	Personality, mindfulness, embodied emotions, ASMR experience	*563	ASMR-responders	ASMR-nonresponders	/	/	ASMR-responders had higher scores on Neuroticism and Openness-to-Experience and lower scores on Agreeableness, Conscientiousness and Extraversion (compared to ASMR-nonresponders)
An examination of the default mode network in individuals with ASMR; S. D. Smith et al. (2017)	Analyzing the default mode network of ASMR-responders	fMRI data, ASMR experience	*22	ASMR-responders	ASMR-nonresponders	/	/	Less overall functional connectivity in the default mode network in ASMR-responders compared to ASMR-nonresponders; but ASMR-responders showed increased connectivity in the default mode network between areas in frontal, occipital, and temporal cortices (compared to ASMR-nonresponders)

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
An eye-tracking approach to ASMR: The physiology and nature of tingles in relation to the pupil; Valtakari et al. (2019)	Investigating pupil diameter and gaze fixation when watching ASMR videos compared to control videos	Gaze fixation, pupil diameter, ASMR experience	**91, 63f, 28 m, —(probably especially students)	Variation 1: One ASMR video with sounds/Variation 2: ASMR-responders	Variation 1: The same ASMR video without sounds/ Variation 2: (a) ASMR-nonresponders, (b) Unsure ASMR-responders	Whispering, personal attention, hair brushing, hand movements	Video/2 min	Significantly greater pupil diameter during ASMR videos compared to control videos when experiencing tingles (regardless of the group), no significant difference with regard to gaze fixation
An fMRI investigation of the neural correlates underlying the ASMR; Lochte et al. (2018)	Examining neural correlates associated with ASMR	fMRI data, Relaxation, ASMR experience	*10, 3f, 7 m, ASMR-responders	Five ASMR videos	/	Whispering, roleplay, tapping, crinkling, personal attention, hair touching, task demonstration, ear-to-ear vocals, caring dispositions	Video/35 min	For ASMR-responders significant activity in areas linked to emotional arousal and reward was observed
ASMR amplifies low frequency and reduces high frequency oscillations; Swart, Banissy, et al. (2022)	Examining oscillatory changes in EEG triggered by ASMR	EEG data, ASMR experience, relaxation experience	**26, 15f, 11 m, ASMR-responder	One individual ASMR video that each participant chose	One scrambled version of the chosen ASMR video (10 min)	—	Video/10 min	ASMR experience may result from high frequency oscillation decreases and low frequency oscillation increases

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
ASMR as idiosyncratic experience: Experimental evidence; Pedrini et al. (2021)	Examining the neurophysiology of ASMR (pupil diameter and brain activity)	EEG data, pupil diameter, ASMR experience, empathy, telepresence	*76, 53f, 23 m, — (probably especially students)	One ASMR video	One resting-state phase (Video showing white screen with black dot), one high arousal video (Video showing a "canyon swing"), one low arousal video (Video showing "blyde canyon"), one control video, length of each video: 30 s	—	Video/30 s	Lower arousal level in the ASMR video condition compared to the other conditions; increased pupillary diameter unrelated to the subjective experience of tingles during ASMR video condition
AEQ: A data-driven step toward accurately classifying ASMR-responders; Swart, Banissy, et al. (2022)	Approach to classify ASMR-responders with the help of the ASMR-Experience Questionnaire	ASMR experience, misophonia, frisson, empathy	*266, 187f, 76 m, 1 undisclosed, general population/ **282	/	/	Whispering, roleplay, drawing, brushing	Video/15 min	Five groupings were identified after participants filled out the AEQ questionnaire (ASMR-Strong, ASMR-Weak, Control+, Control−, False-Positive)
Assessing individual variation in personality and empathy traits in self-reported autonomous sensory meridian response; Janik McErlean and Banissy (2017)	Investigating the association between personality traits as well as empathy and ASMR	ASMR experience, personality, empathy	*168	ASMR-responders	ASMR-nonresponders	/	/	ASMR-responders score higher on Openness-to-Experience, lower on Conscientiousness and they show greater scores on several facettes of empathy

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
Atypical functional connectivity associated with autonomous sensory meridian response: An examination of five resting-state networks; S. D. Smith et al. (2019b)	Analyzing five resting-state networks with regard to ASMR	fMRI data, ASMR experience	*34	ASMR-responders	ASMR-nonresponders	/	/	ASMR-responders showed a reduced functional connectivity in visual and salience networks; atypical patterns of connectivity emerged for ASMR-responders in the central executive, default mode and sensorimotor networks
Audiovisual model for generating eating sounds using food ASMR videos; Uchiyama and Kawamoto (2021)	Generating artificial food eating sounds that are indistinguishable from real food eating sounds	Auditive data related to food sounds	*60, —, —, turkers	/	/	Eating sounds (biting, chewing and swallowing)	Audio/60 s	It was possible to create artificial eating sounds realistic enough to make participants think that they are real
ASMR: a flow-like mental state; Barratt and Davis (2015)	Providing a first general quantitative overview on ASMR asking ASMR-responders about their ASMR usage behavior	ASMR viewing habits, ASMR triggers used, location of the ASMR experience, reason to watch ASMR, flow state, mood, chronic pain	*475, 222f, 245 m, eight nonbinary, ASMR-responders	/	/	/	/	Main findings include that watching ASMR videos could be related to at least a short-term improvement in mood and chronic pain (for ASMR-responders) and that crisp sounds, personal attention, slow movements, and whispering are common ASMR triggers

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
Autonomous sensory meridian response: An ineffective long-term therapeutic intervention; Ditchburn and Bedwell (2019)	Establishing a 1-week RCT comparing ASMR, mindfulness and no intervention with regard to various mental health-associated outcomes	Anxiety, depression, mental well-being	*110, 76f, 33 m, one transgender, —(general population)	(a) Seven ASMR videos	(RCT) (b) Seven mindfulness videos; (c) No intervention	—	Video/7–21 hr	Watching ASMR videos did not improve mental health-related outcomes more than the mindfulness intervention and the control group
Autonomous sensory meridian response and the disability resource center: An exploratory review of student perceptions; A. M. Lee (2023)	Surveying ASMR experiences and whether/how a Disability Resource Center can help people who experience ASMR	ASMR experience, data on a Disability Resource Center	*513, 375f, 133 m, five other/ nonbinary, university students	/	/	/	/	40.16% of participants experience ASMR, it remains unclear how the disability resource center can help people with ASMR
Autonomous sensory meridian response self-reporters showed higher scores for cognitive reappraisal as an emotion regulation strategy; Morales et al. (2021)	Uncovering differences between ASMR-responders and ASMR-nonresponders with regard to emotion regulation strategies	ASMR experience, emotion regulation	*136	ASMR-responders	ASMR-nonresponders	/	/	With regard to emotion regulation strategies, for ASMR-responders higher cognitive reappraisal scores were revealed compared to ASMR-nonresponders
Autonomous sensory meridian response: Individual differences and consciousness correlates; Roberts et al. (2021)	(a) Analyzing the association between ASMR and alterations in consciousness (including mindfulness); (b) validation of the ASMR-15 Questionnaire	ASMR experience, mindfulness, unusual experiences, transliminality, body consciousness, ASMR trigger preferences	*318, 169f, 139 m, ASMR interest groups/**457	/	/	/	/	(a) ASMR is linked to altered Consciousness, but not to mindfulness; (b) as a measure of ASMR propensity, the ASMR-15 displays decent reliability and validity

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
Autonomous sensory meridian response: Scale development and personality correlates; Roberts et al. (2019)	Determining the psychometric criteria of the ASMR-15 conducting three different studies, including (a) internal consistency and validity; and (b) convergent and divergent validity by comparing ASMR to other constructs	ASMR experience, anxiety, absorption, misophonia, frisson, alexithymia, flow	*Study 1: 303 descriptions of ASMR, —, —, (predominantly) ASMR users/ Study 2: 453, 133f, 320 m, (predominantly) ASMR users/ Study 3: 820, 240f, 580 m, (predominantly) ASMR users	/	/	/	/	(a) Sufficient internal consistency and validity was uncovered for the ASMR-15; (b) ASMR was not or hardly correlated with anxiety, absorption, misophonia, frisson, alexithymia and flow and can therefore be considered as an independent construct
Autonomous sensory meridian response: Sensitivity and Personality Correlates; Roberts et al. (2020b)	(a) Analyzing the association between ASMR and personality correlates; (b) validation of the ASMR-15 Questionnaire	ASMR experience, sensory processing sensitivity, personality, previous ASMR experiences, prior ASMR awareness	*185, 163f, 21 m, psychology undergraduates/ ** 187	/	/	/	/	(a) ASMR was linked to higher Openness and sensory processing sensitivity scores and to lower Conscientiousness scores; (b) the factor structure of the ASMR-15 could be replicated
Cortical activation changes associated with ASMR: Initial case report; Seifzadeh et al. (2021)	Identifying the impact of ASMR on EEG band power in a single case study	EEG data	*one, f, ASMR-responder	One ASMR video	/	Whispering, tapping, scratching, personal attention, eating sounds, smiling	Video/20 min	In general, δ band power was reduced (pre vs. post-ASMR video stimulation) but no differences with regard to theta band power emerged, furthermore more specific changes in different brain regions were revealed

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
Dark, loud, and compact sounds induce frisson; Koumura et al. (2021)	(a) Testing the individual consistency of frisson (Study 1); (b) trying to uncover a link between frisson experience and acoustic features of auditory stimuli (Study 2)	Mood, depression, personality, frisson	*Study 1: 10, 7f, 3 m, college students/Study 2: 30, 17f, 13 m, college students	One ASMR sound audio file	/	Tapping, brushing	Audio/1.02 s	(a) frisson experience shows a high reliability within a participant; (b) frisson is triggered by proximal sounds featuring compact, dark timbre
Effect of watching AMR video to heart rate, blood pressure, and respiratory rate in students of architectural engineering, universitas Syiah Kuala, Banda Aceh, Indonesia; Idayati et al. (2021)	Determining the effects of watching an ASMR video on blood pressure, heart rate, and respiratory rate	Heart rate, blood pressure, respiratory rate	* 30, 15f, 15 m, students	One ASMR video	/	Roleplay	Video/3 min	Significant decreases with respect to heart rate and blood pressure but not respiratory rate were observed pre–post
Effects of Autonomous sensory meridian response on the functional connectivity as measured by functional magnetic resonance imaging; S. Lee et al. (2020)	Evaluating the effects of ASMR on functional connectivity	fMRI data, feelings (positive and negative)	*28, 13f, 15 m, general population	One ASMR video	Staring at a fixation point for 5 min	Scratching sound, slow, and repetitive movement	Video/5 min	Many connections within different networks were greater during ASMR video stimulation (connections between posterior cingulate cortex and superior temporal gyrus, between pregenual anterior cingulate cortex and medial prefrontal cortex and between right posterior insular cortex and cuneus)

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
Expectancy effects in the autonomous sensory meridian response; Cash et al. (2018)	Investigating whether expectation effects are crucial for ASMR experience	ASMR experience	*209	Variation 1: Five ASMR videos/ Variation 2: ASMR enthusiasts/ Variation 3: Encouraging instructions	(RCT) Variation 1: Six videos including normal voice narration and phone conversation, a person screaming, playing piano, drumming with fingers and a technological music song/ Variation 2: College students/ Variation 3: Discouraging instructions	Personal attention, whispering, tapping sounds, repetitive noise, white noise	Video/5 min	Encouraging instructions increased ASMR ratings in naïve participants but not in ASMR enthusiasts
Functional connectivity associated with five different categories of ASMR triggers; S. D. Smith et al. (2020)	Investigating whether the variation in functional connectivity found in ASMR-responders differs depending on which trigger is used	fMRI data, ASMR experience	*15, 8f, 7 m, ASMR-responders	15 ASMR videos	/	Watching others do something, watching others be touched, tapping/ scratching, roleplay, whispering	Video/—	Unique patterns of functional connectivity were identified for the different ASMR triggers used
Improving mindful attention awareness among Saudi nursing students through autonomous sensory meridian response stimulation; Maniago et al. (2021)	Determining the effect of three different ASMR interventions on mindful attention awareness	Mindful attention awareness	*54	(a) Whispering ASMR video; (b) Auditory ASMR video; (c) Personal attention ASMR video	(RCT)	Whispering, auditory triggers, personal attention	Video/20 min	The whispering group and auditory group achieved a greater improvement in mindful attention awareness compared to the personal attention group

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
Increased absorption in autonomous sensory meridian response; Janik McErlean and Osborne-Ford (2020)	Evaluating the difference in absorption, mindfulness and flow levels between ASMR-responders and controls	Absorption, mindfulness, flow, ASMR experience, ASMR usage behavior	*248	ASMR-responders	ASMR-nonresponders	/	/	Higher absorption levels in ASMR-responders compared to controls, no differences with regard to mindfulness or flow
Increased misophonia in self-reported autonomous sensory meridian response; Janik McErlean and Banissy (2018)	Evaluating the association between ASMR and misophonia by comparing ASMR-responders and ASMR-nonresponders	Misophonia, ASMR experience	*132	ASMR-responders	ASMR-nonresponders	/	/	ASMR-responders compared to ASMR-nonresponders score higher on misophonia for all included misophonia subscales
Individuals who experience autonomous sensory meridian response have higher levels of sensory suggestibility; Keizer et al. (2020)	Examining the difference between ASMR-responders and ASMR-nonresponders with respect to sensory suggestibility	Sensory suggestibility, ASMR experience	*61	ASMR-responders	ASMR-nonresponders	/	/	ASMR-responders compared to ASMR-nonresponders display higher sensory suggestibility scores
Induction of relaxation by autonomous sensory meridian response; Sakurai et al. (2021)	Gaining information on different brain activation (using fMRI) and subjective mood/ somatosensation regarding ASMR and classical music stimuli	fMRI data, somatosensation, mood	*30, 12f, 18 m, ASMR-nonenthusiasts/ **36	(a) 10 ASMR sound audio files	(b) Classical music; (c) White noise	Scratching, eating sounds, tapping, water sounds, nature sounds	Audio/5 min	(a) No difference was observed between ASMR and classical music in terms of comfort related mood, but ASMR was associated with higher tingle related mood scores;

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
								(b) with regard to brain activity ASMR was associated with more activity in general, especially in the medial prefrontal cortex
Influence of autonomous sensory meridian response on relaxation states: An experimental study; Yusaira and Bennett (2021)	Assessing the influence of an ASMR video compared to a control video on relaxation states and stress states	Relaxation, general health	*60, 43f, 17 m, students	One ASMR video	(RCT) One neutral video (multiple, unspecified small videos being combined to a single video)	—	Video/16 min	Compared to the control group, the ASMR group shows an increase in sleepiness, but on the other hand a decrease in joy, love and thankfulness and prayerfulness—all other outcomes do not differ between the groups
Mindfulness and ASMR; B. K. Fredborg et al. (2018)	Examining the extent to which ASMR is associated with mindfulness	Personality, mindfulness, embodied emotions, ASMR experience	*563	ASMR-responders	ASMR-nonresponders	/	/	ASMR-responders had significantly higher scores than ASMR-nonresponders on both included measures of mindfulness
More than a feeling: ASMR is characterized by reliable changes in affect and physiology; G. L. Poerio et al. (2018)	Study 1: Finding out whether affect and frequency of tingling sensations differ between ASMR-responders and ASMR-	ASMR experience, affect	*1,002, 481f, 521 m/** 2073	Variation 1: 12 ASMR videos/ Variation 2: ASMR-responders	Variation 1: Six control videos (demonstration and instruction videos as well as sound-only videos; length:	Whispering, roleplay, hand movements, close personal attention, scratching sounds, slow and	Video/36 min	Only concerning ASMR videos but not concerning control videos ASMR-responders (compared to ASMR-

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
	nonresponders after watching ASMR videos and non-ASMR videos				3 min per video)/Variation 2: ASMR-nonresponders	repetitive movements		nonresponders) experienced more tingling sensations, more calmness and excitement and less sadness and stress after watching ASMR videos
	Study 2: Determining whether ASMR is associated with changes in affect and physiological measures such as heart rate and skin conductance level	ASMR experience, affect, heart rate, skin conductance level	*110, 64f, 46 m/** 112	Variation 1: (a) ASMR video, (b) self-selected ASMR video/ Variation 2: ASMR-responders	Variation 1: (c) control video (cooking demonstration video), 3 min. long/Variation 2: ASMR-nonresponders	Whispering, hand movements, folding a towel	Video/6 min	(a) Similar results as study 1 with regard to tingling sensations and affect; (b) For ASMR-responders (but not for ASMR-nonresponders), while watching ASMR videos skin conductance level went up, while heart rate went down
Possible effect of binaural beat combined with autonomous sensory meridian response for inducing sleep; M. Lee et al. (2019)	(a) Testing at which decibel ratio a combination of binaural beat and ASMR triggers is most likely to lead to theta power (associated with sleep) and psychological stability; (b)	EEG data, psychological stability	*15, 1f, 14 m, —	For 1): (a) Binaural beats:ASMR triggers = 45:60db; (b) Binaural beats: ASMR triggers = 30:60db; (c) Binaural beats: ASMR triggers = 20:60db, for 2) (a) Combined ASMR	For 2): d) Silent stimulus (sham)	Nature sounds	Audio/3 min.	(a) In terms of theta power and psychological stability, stimuli with a decibel ratio of 30:60 (Binaural Beat:ASMR) achieved the best results compared to two other db ratios; (b) ASMR only and

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
	Examining whether a combination of binaural beat and ASMR triggers leads to better results in terms of inducing theta power and psychological stability than only binaural beat or only ASMR or sham			and binaural beat sound/(b) Only ASMR sound/(c) Only binaural beat sound				combined ASMR with binaural beat resulted in some improvements of psychological stability compared to binaural beat only and sham (e.g., more calmness, more happiness, less anger); Significant changes in theta power after audio stimulation were observed in all conditions except sham, but in different brain regions
Proximal binaural sound can induce subjective frisson; Honda et al. (2020)	Trying to induce frisson (being associated with ASMR) via ASMR typical sounds that are either presented static or moving around the head of the participant	ASMR/frisson experience, pleasantness, anxiety, impulsive behavior	*19, 11f, 8 m, general population	Variation 1: (a) One binaural bead ASMR sound audio; (b) one binaural plastic bag ASMR sound audio; (c) one monaural bead ASMR sound audio; (d) one monaural plastic bag ASMR sound audio/Variation 2: (a) Moving sounds; (b) Static sounds	Variation 1: (e) One binaural white noise audio; (f) one binaural music audio; (g) one monaural white noise audio; (h) one monaural music audio	Interaction with objects	Audio/—	Frisson is experienced more when auditory stimuli are moving around the head instead of being presented without movement (regardless of the presented sound), no correlation between subjective frisson and impulsiveness and anxiety was revealed

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
Research on the application of ASMR in the development and design of sleeping products; M. Wang and Li (2020)	Investigating the influence of a pillow with speakers playing ASMR sounds on the quality of sleep	Different outcomes regarding sleep (quality)	* 18, —, —,	/	/	—	Audio/—	Less participants reported that they were not able to sleep after the intervention (change from 55.6% before to 11% after the intervention), more participants were able to sleep through the night after the intervention (before: 27.8%; after: 88.9%)
Sensory channel effects of autonomous sensory meridian response on short-term memory; Kim et al. (2019)	Evaluating how ASMR affects short-term memory and if there is a difference between ASMR videos/ASMR sounds/a combination of both	Short-term memory function, affect	*45, 15f, 30 m, college students	Variation 1: Two ASMR videos/ Variation 2: (a) Visual channel; (b) Auditory channel; (c) Visual + auditory channel	(RCT) Variation 1: One control video (Excerpt from a horror movie)	Cutting, brushing	Both/5 min	Compared to the control content, the ASMR content improved the short-term memory results significantly, but only for participants who received the ASMR content auditorily
Sensory determinants of the ASMR: understanding the triggers; Barratt et al. (2017)	Gaining information on how ASMR triggers must be designed to trigger ASMR	Different data on trigger characteristics, ASMR experience	*130, 91f, 33 m, 2 transgenders, 4 nonbinary, ASMR-responders	/	/	/	/	Several preferable trigger characteristics were revealed: (a) ASMR content should be unscripted; (b) lower pitched and natural sounds are preferable; (c)

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
								mouth sounds and background music should be avoided; (d) fine visual detail focus might be essential; (e) one single trigger is enough for triggering ASMR
Sexuality versus sensuality: The multimodal construction of affective stance in Chinese ASMR performances; Starr et al. (2020)	Content analysis of ASMR videos and S-ASMR (sexual ASMR) videos in terms of video characteristics	Video characteristics, sound characteristics	1	15 ASMR videos	25 S-ASMR videos	—	Video/—	The content analysis indicates that a distinction should be made between ASMR and S-ASMR (sexual ASMR), with ASMR in general not providing sexual content
Storyscaping in fashion brand using commitment and nostalgia based on ASMR marketing; Chae et al. (2021)	Designing a model offering indications how exposure to ASMR advertising might lead to actual purchasing behavior	Commitment (to ASMR), nostalgia (related to ASMR), brand equity, impulse buying (related to ASMR), electronic word-of-mouth	435, 304f, 131 m, preexperienced ASMR users	/	/	/	/	Only about half of the assumed influences in the model are confirmed (ASMR-related commitment influences nostalgia, but nostalgia does mostly not influence brand equity and brand equity mostly does not fully influence behavior).

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
Study on the health application of the snow stepping sound; Tian et al. (2020)	Sound analysis of snow stepping sounds and evaluation of its effect on EEG frequency bands	Data on sound characteristics, EEG data	*four, —, —, college students	One ASMR sound audio file	/	Nature sounds (snow stepping)	Audio/1 min	Snow stepping sounds can reach a frequency similar to the frequency of human vocal cords and might thus be able to be processed by human hearing systems more easily; Snow stepping sounds on the one hand lead to an increase of α waves and β waves, on the other hand to a decrease of δ waves and theta waves
The awesome as well as the awful: Heightened sensory sensitivity predicts the presence and intensity of ASMR; G. L. Poerio et al. (2022)	Exploring the relationship between ASMR and sensory sensitivity	ASMR experience, mindfulness, sensory sensitivity	*557	ASMR-responders	ASMR-nonresponders	/	/	Compared to ASMR-nonresponders, ASMR-responders have a greater sensory sensitivity
The effects of ASMR videos on arousal and mood in adults with and without depression and insomnia; Smejka and Wiggs (2022)	Examination whether ASMR ameliorates mood and minimizes arousal in participants with depression and/or insomnia symptoms	ASMR experience, insomnia, depression, mood, arousal	*1,037, 756f, 267 m, 14 others	One ASMR video/ Variation 1: (a) ASMR-responders/ Variation 2: (a) Depression; (b) Insomnia; (c) Combined	Variation 1: (b) ASMR-nonresponders; (c) Ambiguous ASMR-responders/ Variation 2: (d) Control	Popular auditory triggers	Video/2 min	Compared to the ASMR-nonresponders and the ambiguous ASMR-responders, ASMR-responders increased their mood and experienced a decrease in arousal

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
								after watching an ASMR video (participants in the combined and depression groups benefited the most)
The impact of different sounds on stress level in the context of EEG, cardiac measures and subjective stress level: A Pilot Study; Paszkiel et al. (2020)	Determining the influence of various forms of music (including ASMR-triggering music) on stress levels	EEG data, blood pressure, heart rate, subjective stress level	*nine, 9f, 0 m, general population	(a) One ASMR-triggering music audio	(b) One relaxing music (forest ambience) audio; (c) one rap music audio; (d) Silence	—	Audio/—	Compared to the other conditions, ASMR-triggering music and relaxation music are best for EEG associated stress reduction, but not for other stress-related conditions like heart rate reduction, blood pressure or subjective stress level
The influence of ASMR on individual's executive function; X. Wang et al. (2020)	Evaluating the difference between ASMR-responders and ASMR-nonresponders concerning executive function and determining the potential influence of ASMR on this domain	ASMR experience, working memory span, set shifting, inhibitory control	*212	Variation 1: (a) ASMR sound audio file/ Variation 2: ASMR-responders	Variation 1: (b) Not further specified normal-speaking clip; (c) No auditory treatment/ Variation 2: ASMR-nonresponders	Whispering, roleplay	Audio/15 min	ASMR-responders and ASMR-nonresponders do not differ with regard to executive functions, but an ASMR video can reduce set shifting and inhibitory control abilities in ASMR-responders

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
Two studies of ASMR: The relationship between ASMR and music-induced frisson; Kovacevich and Huron (2019)	Study 1: Content analysis of ASMR videos compared to two different types of control videos	Ratings of video contents	*2	30 ASMR videos (most popular on YouTube)	Control condition 1: 30 equally popular non-ASMR-control videos, Control condition 2: 30 non-ASMR-control videos depicting someone addressing the camera in an indoor setting	A range of different ASMR stimuli	Video/—	ASMR videos involve more audio roaming, intimacy, and oral wetness cues and less syllable-rate, vocal energy, and voicing compared to both kinds of control videos
	Study 2: Content analysis of ASMR videos trying to assign Youtube comments to different categories	Categorization of YouTube comments	*2	30 ASMR videos (most popular on YouTube)	/	A range of different ASMR stimuli	Video/—	The Youtube comments could be assigned to five different categories: Psychology (rater 1: 1,375/rater 2: 1819), etiology (968/690), physiology (260/290), function (174/224), and "otherwise interesting" (229/411)
Untangling the tingle: Investigating the association between the ASMR, neuroticism, and trait and state anxiety; Eid et al. (2022)	Examining the link between ASMR, trait and state anxiety, and neuroticism	ASMR experience, neuroticism, trait, and state anxiety, ASMR video engagement	*64, 46f, 17 m, one other	One ASMR video/ ASMR-responders	ASMR-nonresponders	Tapping, scratching, roleplay, microphone brushing	Video/5 min	(a) Compared to ASMR-nonresponders, ASMR-responders experience more state anxiety and

(*table continues*)

Table 1 (*continued*)

Name of the study	Main aim	Collected data (besides demographics)	Total participant number and characteristics	Main condition(s)	Control condition(s)	Specific ASMR triggers used	ASMR video or ASMR audio? (+ total length)	Main findings
								have higher scores with regard to trait anxiety and neuroticism; (b) In ASMR-responders (but not in ASMR-nonresponders) state anxiety was reduced after watching an ASMR video
Unusual experiences and their association with metacognition: investigating ASMR and Tulpamancy; Palmer-Cooper et al. (2022)	Investigating unusual experiences and metacognition in ASMR-responders and Tulpamancy self-reporters	ASMR experience, tulpamancy, unusual experiences (hallucination-proneness, delusion-proneness), metacognition	*246	ASMR-responders	ASMR-nonresponders	/	/	Higher hallucination-proneness for participants experiencing ASMR and identifying as Tulpamancers compared to the other examined groups, but no difference regarding delusion-proneness; Tulpamancers report fewer metacognitive beliefs compared to the other groups

Note. — = no information available; / = information not relevant with regard to the study design used; CG = control group; EG = experimental group; RCT = randomized controlled trial; *SD* = standard deviation; ASMR = autonomous sensory meridian response; EEG = electroencephalography; AEQ = ASMR-Experience Questionnaire; fMRI = functional magnetic resonance imaging; S-ASMR = sexual–ASMR.
* indicates data analysis. ** indicates recruited. *** indicates not clear.

Table 2

Assessment of Risk of Bias and the Quality of the Articles of the Systematic Review

Yes = 1, No = 0, Unclear = ?, Not applicable = —	1. Were the criteria for inclusion in the sample clearly defined?	2. Were the study subjects and the setting described in detail?	3. Were confounding factors identified?	4. Were strategies to deal with confounding factors stated?	5. Were the outcomes measured in a valid and reliable way?	6. Was appropriate statistical analysis used?	1. Are the main results of the study immediately identifiable from the abstract?	2. Was the construct of ASMR clearly defined in the body of the text?	3. Were a priori hypotheses stated that are referred to throughout the article and are the methods and analyses suited to investigate these?	4. Is every central information in Table 1 available? (e.g., collected data, study design, participant characteristics, stimulus description)	5. Is the interpretation of the results coherent and plausible?	Total
A functional magnetic resonance imaging investigation of the autonomous sensory meridian response; S. D. Smith et al (2019a)	1	1	0	0	1	1	1	1	1	1	1	9
A Large-Scale Study of Misophonia; Rouw and Erfanian (2018)	0	1	1	1	1	1	1	1	1	0	1	9
A mixed-methods examination of autonomous sensory meridian response: Comparison to frisson; Roberts et al. (2020a)	1	1	0	0	1	1	1	1	0	1	1	8
A preliminary compilation of a digital video library on triggering ASMR: A trial among 807 Chinese college students; Liu and Zhou (2019)	0	1	0	0	1	1	1	1	0	1	1	7
A study on the human body response to the sound stepping on fallen leaves in ASMR; Ahn (2020)	0	0	0	0	0	0	0	0	0	0	0	0
A study on the human sensation of the reed wind sound in ASMR; Ahn et al. (2019)	0	0	0	0	1	0	0	0	0	0	0	1
A study on the influence of watching Youtube sound content (ASMR) on youth learning and life; Jeong (2020)	1	0	0	0	0	1	1	0	0	0	0	3

(*table continues*)

Table 2 (*continued*)

Yes = 1, No = 0, Unclear = ?, Not applicable = —	1. Were the criteria for inclusion in the sample clearly defined?	2. Were the study subjects and the setting described in detail?	3. Were confounding factors identified?	4. Were strategies to deal with confounding factors stated?	5. Were the outcomes measured in a valid and reliable way?	6. Was appropriate statistical analysis used?	1. Are the main results of the study immediately identifiable from the abstract?	2. Was the construct of ASMR clearly defined in the body of the text?	3. Were a priori hypotheses stated that are referred to throughout the article and are the methods and analyses suited to investigate these?	4. Is every central information in Table 1 available? (e.g., collected data, study design, participant characteristics, stimulus description)	5. Is the interpretation of the results coherent and plausible?	Total
An electroencephalographic examination of the ASMR; B. K. Fredborg et al. (2021)	1	1	1	1	1	1	1	1	1	0	1	10
An examination of personality traits associated with ASMR; B. Fredborg et al. (2017)	0	1	0	1	1	1	1	1	1	1	1	9
An examination of the default mode network in individuals with ASMR; S. D. Smith et al. (2017)	1	1	0	0	1	1	1	1	0	0	1	7
An eye-tracking approach to ASMR: The physiology and nature of tingles in relation to the pupil; Valtakari et al. (2019)	0	1	1	1	1	1	0	1	1	0	1	8
An fMRI investigation of the neural correlates underlying the ASMR; Lochte et al. (2018)	0	1	1	1	1	1	1	1	0	1	1	9
ASMR amplifies low frequency and reduces high frequency oscillations; Swart, Banissy, et al. (2022)	1	1	1	0	1	1	1	1	0	0	1	8
ASMR as idiosyncratic experience: Experimental evidence; Pedrini et al. (2021)	1	0	0	0	1	1	1	1	1	0	0	6
AEQ: A data-driven step toward accurately classifying	0	1	0	0	1	1	1	1	1	1	1	8

(*table continues*)

Table 2 (*continued*)

Yes = 1, No = 0, Unclear = ?, Not applicable = —	1. Were the criteria for inclusion in the sample clearly defined?	2. Were the study subjects and the setting described in detail?	3. Were confounding factors identified?	4. Were strategies to deal with confounding factors stated?	5. Were the outcomes measured in a valid and reliable way?	6. Was appropriate statistical analysis used?	1. Are the main results of the study immediately identifiable from the abstract?	2. Was the construct of ASMR clearly defined in the body of the text?	3. Were a priori hypotheses stated that are referred to throughout the article and are the methods and analyses suited to investigate these?	4. Is every central information in Table 1 available? (e.g., collected data, study design, participant characteristics, stimulus description)	5. Is the interpretation of the results coherent and plausible?	Total
ASMR-responders; Swart, Bowling, et al. (2022)												
Assessing individual variation in personality and empathy traits in self-reported autonomous sensory meridian response; Janik McErlean and Banissy (2017)	0	1	0	0	1	1	1	1	0	1	1	7
Atypical functional connectivity associated with autonomous sensory meridian response: An examination of five resting-state networks; S. D. Smith et al. (2019b)	1	1	1	1	1	1	1	1	1	1	1	11
Audiovisual model for generating eating sounds using food ASMR videos; Uchiyama and Kawamoto (2021)	0	0	0	0	1	1	1	0	0	0	1	4
ASMR: a flow-like mental state; Barratt and Davis (2015)	0	1	0	0	1	1	1	1	0	1	1	7
Autonomous sensory meridian response: An ineffective long-term therapeutic intervention; Ditchburn and Bedwell (2019)	0	1	0	0	1	1	0	1	0	0	1	5
Autonomous sensory meridian response and the disability resource center: An	0	1	0	0	0	1	0	0	0	0	0	2

(*table continues*)

Table 2 (*continued*)

Yes = 1, No = 0, Unclear = ?, Not applicable = —	1. Were the criteria for inclusion in the sample clearly defined?	2. Were the study subjects and the setting described in detail?	3. Were confounding factors identified?	4. Were strategies to deal with confounding factors stated?	5. Were the outcomes measured in a valid and reliable way?	6. Was appropriate statistical analysis used?	1. Are the main results of the study immediately identifiable from the abstract?	2. Was the construct of ASMR clearly defined in the body of the text?	3. Were a priori hypotheses stated that are referred to throughout the article and are the methods and analyses suited to investigate these?	4. Is every central information in Table 1 available? (e.g., collected data, study design, participant characteristics, stimulus description)	5. Is the interpretation of the results coherent and plausible?	Total
exploratory review of student perceptions; A. M. Lee (2023)												
Autonomous sensory meridian response self-reporters showed higher scores for cognitive reappraisal as an emotion regulation strategy; Morales et al. (2021)	0	1	1	1	1	1	1	1	1	1	0	9
Autonomous sensory meridian response: Individual differences and consciousness correlates; Roberts et al. (2021)	0	1	1	0	1	1	1	1	1	1	1	9
Autonomous sensory meridian response: Scale development and personality correlates; Roberts et al. (2019)	0	1	0	0	1	1	1	1	1	1	1	8
Autonomous sensory meridian response: Sensitivity and personality correlates; Roberts et al. (2020b)	1	1	1	1	1	1	1	1	0	1	1	10
Cortical activation changes associated with ASMR: Initial	—	1	0	0	1	0	1	1	0	1	0	5

(*table continues*)

Table 2 (*continued*)

Yes = 1, No = 0, Unclear = ?, Not applicable = —	1. Were the criteria for inclusion in the sample clearly defined?	2. Were the study subjects and the setting described in detail?	3. Were confounding factors identified?	4. Were strategies to deal with confounding factors stated?	5. Were the outcomes measured in a valid and reliable way?	6. Was appropriate statistical analysis used?	1. Are the main results of the study immediately identifiable from the abstract?	2. Was the construct of ASMR clearly defined in the body of the text?	3. Were a priori hypotheses stated that are referred to throughout the article and are the methods and analyses suited to investigate these?	4. Is every central information in Table 1 available? (e.g., collected data, study design, participant characteristics, stimulus description)	5. Is the interpretation of the results coherent and plausible?	Total
case report; Seifzadeh et al. (2021)												
Dark, loud, and compact sounds induce frisson; Koumura et al. (2021)	0	1	1	0	1	1	1	1	0	1	1	8
Effect of watching ASMR video to heart rate, blood pressure, and respiratory rate in students of architectural engineering, universitas Syiah Kuala, Banda Aceh, Indonesia; Idayati et al. (2021)	1	1	0	0	1	1	1	1	0	1	0	7
Effects of autonomous sensory meridian response on the functional connectivity as measured by functional magnetic resonance imaging; S. Lee et al. (2020)	0	0	1	1	1	1	1	1	1	1	1	9
Expectancy effects in the autonomous sensory meridian response; Cash et al. (2018)	0	1	1	1	1	1	1	1	0	1	0	8
Functional connectivity associated with five different categories of ASMR triggers; S. D. Smith et al. (2020)	0	1	1	1	1	1	1	1	0	1	1	9
Improving mindful attention awareness among Saudi nursing students through autonomous sensory meridian	1	1	0	0	1	1	1	1	0	1	1	8

(*table continues*)

Table 2 (*continued*)

Yes = 1, No = 0, Unclear = ?, Not applicable = —	1. Were the criteria for inclusion in the sample clearly defined?	2. Were the study subjects and the setting described in detail?	3. Were confounding factors identified?	4. Were strategies to deal with confounding factors stated?	5. Were the outcomes measured in a valid and reliable way?	6. Was appropriate statistical analysis used?	1. Are the main results of the study immediately identifiable from the abstract?	2. Was the construct of ASMR clearly defined in the body of the text?	3. Were a priori hypotheses stated that are referred to throughout the article and are the methods and analyses suited to investigate these?	4. Is every central information in Table 1 available? (e.g., collected data, study design, participant characteristics, stimulus description)	5. Is the interpretation of the results coherent and plausible?	Total
response stimulation; Maniago et al. (2021)												
Increased absorption in autonomous sensory meridian response; Janik McErlean and Osborne-Ford (2020)	0	1	0	0	1	1	1	1	0	1	1	7
Increased misophonia in self-reported autonomous sensory meridian response; Janik McErlean and Banissy (2018)	0	1	1	0	1	1	1	1	1	1	1	9
Individuals who experience autonomous sensory meridian response have higher levels of sensory suggestibility; Keizer et al. (2020)	0	0	0	0	1	1	1	1	1	0	1	6
Induction of relaxation by autonomous sensory meridian response; Sakurai et al. (2021)	1	1	0	0	1	1	1	1	0	1	1	8
Influence of autonomous sensory meridian response on relaxation states: An experimental study; Yusaira and Bennett (2021)	1	1	0	0	1	1	1	1	1	0	1	8
Mindfulness and ASMR; B. K. Fredborg et al. (2018)	0	1	0	0	1	1	1	1	1	1	1	8
More than a feeling: ASMR is characterized by reliable changes in affect and	0	1	1	0	1	1	1	1	1	0	1	8

(*table continues*)

Table 2 (*continued*)

Yes = 1, No = 0, Unclear = ?, Not applicable = —	1. Were the criteria for inclusion in the sample clearly defined?	2. Were the study subjects and the setting described in detail?	3. Were confounding factors identified?	4. Were strategies to deal with confounding factors stated?	5. Were the outcomes measured in a valid and reliable way?	6. Was appropriate statistical analysis used?	1. Are the main results of the study immediately identifiable from the abstract?	2. Was the construct of ASMR clearly defined in the body of the text?	3. Were a priori hypotheses stated that are referred to throughout the article and are the methods and analyses suited to investigate these?	4. Is every central information in Table 1 available? (e.g., collected data, study design, participant characteristics, stimulus description)	5. Is the interpretation of the results coherent and plausible?	Total
physiology; G. L. Poerio et al. (2018)												
Possible effect of binaural beat combined with autonomous sensory meridian response for inducing sleep; M. Lee et al. (2019)	0	0	0	0	1	1	1	1	0	1	1	6
Proximal binaural sound can induce subjective frisson; Honda et al. (2020)	0	0	0	0	1	1	1	1	0	1	1	6
Research on the application of ASMR in the development and design of sleeping products; M. Wang and Li (2020)	0	0	0	0	0	0	0	0	0	0	0	0
Sensory channel effects of autonomous sensory meridian response on short-term memory; Kim et al. (2019)	0	1	0	0	1	1	1	1	0	0	1	6
Sensory determinants of the ASMR: understanding the triggers; Barratt et al. (2017)	0	1	1	0	1	1	1	1	0	1	1	8
Sexuality versus sensuality: The multimodal construction of affective stance in Chinese ASMR performances; Starr et al. (2020)	0	0	0	0	0	1	1	1	0	0	1	4
Storyscaping in fashion brand using commitment and	0	1	0	0	1	1	0	0	1	0	0	4

(*table continues*)

Table 2 (*continued*)

Yes = 1, No = 0, Unclear = ?, Not applicable = —	1. Were the criteria for inclusion in the sample clearly defined?	2. Were the study subjects and the setting described in detail?	3. Were confounding factors identified?	4. Were strategies to deal with confounding factors stated?	5. Were the outcomes measured in a valid and reliable way?	6. Was appropriate statistical analysis used?	1. Are the main results of the study immediately identifiable from the abstract?	2. Was the construct of ASMR clearly defined in the body of the text?	3. Were a priori hypotheses stated that are referred to throughout the article and are the methods and analyses suited to investigate these?	4. Is every central information in Table 1 available? (e.g., collected data, study design, participant characteristics, stimulus description)	5. Is the interpretation of the results coherent and plausible?	Total
nostalgia based on ASMR marketing; Chae et al. (2021)												
Study on the health application of the snow stepping sound; Tian et al. (2020)	0	0	0	0	1	0	0	0	0	0	0	1
The awesome as well as the awful: Heightened sensory sensitivity predicts the presence and intensity of ASMR; G. L. Poerio et al. (2022)	1	1	0	0	1	1	1	1	0	1	1	8
The effects of ASMR videos on arousal and mood in adults with and without depression and insomnia; Smejka and Wiggs (2022)	0	1	1	1	1	1	1	1	1	1	1	10
The impact of different sounds on stress level in the context of EEG, cardiac measures, and subjective stress level: A pilot study; Paszkiel et al. (2020)	1	0	0	0	1	1	1	0	0	0	0	4
The influence of autonomous sensory meridian response on individual's executive function; X. Wang et al. (2020)	0	1	1	0	1	1	1	1	0	1	1	8
Two studies of ASMR: The relationship between ASMR	1	0	0	0	1	1	1	1	0	1	0	6

(*table continues*)

Table 2 (*continued*)

Yes = 1, No = 0, Unclear = ?, Not applicable = —	1. Were the criteria for inclusion in the sample clearly defined?	2. Were the study subjects and the setting described in detail?	3. Were confounding factors identified?	4. Were strategies to deal with confounding factors stated?	5. Were the outcomes measured in a valid and reliable way?	6. Was appropriate statistical analysis used?	1. Are the main results of the study immediately identifiable from the abstract?	2. Was the construct of ASMR clearly defined in the body of the text?	3. Were a priori hypotheses stated that are referred to throughout the article and are the methods and analyses suited to investigate these?	4. Is every central information in Table 1 available? (e.g., collected data, study design, participant characteristics, stimulus description)	5. Is the interpretation of the results coherent and plausible?	Total
and music-induced frisson; Kovacevich and Huron (2019)												
Untangling the tingle: Investigating the association between the ASMR, neuroticism, and trait and state anxiety; Eid et al. (2022)	0	1	1	1	1	1	1	1	1	1	1	10
Unusual experiences and their association with metacognition: investigating ASMR and Tulpamancy; Palmer-Cooper et al. (2022)	1	1	1	1	1	1	1	1	1	1	1	11

Note. ASMR = autonomous sensory meridian response; AEQ = ASMR-Experience Questionnaire; EEG = electroencephalography; fMRI = functional magnetic resonance imaging.

Table 3
Defining Components of ASMR in the Individual Studies Uncovered by the Systematic Search

Article, authors	Defining components	References
1. A functional magnetic resonance imaging investigation of the autonomous sensory meridian response; S. D. Smith et al. (2019a)	*Bodily experience* • (1) Tingling sensations across the scalp, the neck, and the shoulders that can spread down the back and the limbs *Feeling* • (2) Calming • (2) Emotionally positive	(1) Barratt and Davis (2015) (2) G. L. Poerio et al. (2018)
2. A Large-Scale Study of Misophonia; Rouw and Erfanian (2018)	*Bodily experience* • (1) Tingling sensations on the skin across the scalp, the neck, and the spine *Feeling* • (1) Feelings of euphoria • (1) Pleasant • (1) Relaxing • (2) Pain-relieving • (2) Stress-relieving	(1) — (2) Barratt and Davis (2015)
3. A mixed-methods examination of autonomous sensory meridian response: Comparison to frisson; Roberts et al. (2020a)	*Bodily experience* • Tingling sensation on the head *Feeling* • Comforting • Feelings of euphoria • Pleasant • Relaxing	Barratt and Davis (2015) G. L. Poerio et al. (2018) Roberts et al. (2019)
4. A preliminary compilation of a digital video library on triggering ASMR: A trial among 807 Chinese college students; Liu and Zhou (2019)	*Bodily experience* • Tingling sensation across the scalp and the back of the neck that can spread into further parts of the body • Static-like *Feeling* • —	Barratt and Davis (2015)
5. A study on the human body response to the sound of stepping on fallen leaves in ASMR; Ahn (2020)	*Bodily experience* • — *Feeling* • Psychological stability • Pleasant • Difficult to describe	S. G. Bae and Bae (2017) Kang (2016) S. D. Smith et al. (2017)
6. A study on the human sensation of the reed wind sound in ASMR; Ahn et al. (2019)	*Bodily experience* • — *Feeling* • Psychological stability • Pleasant • Difficult to describe	S. D. Smith et al. (2017) Barratt and Davis (2015) S. Bae et al. (2013)
7. A study on the influence of watching Youtube sound content (ASMR) on youth learning and life; Jeong (2020)	*Bodily experience* • — *Feeling* • Peace of mind and healing	—
8. An electroencephalographic examination of ASMR; B. K. Fredborg et al. (2021)	*Bodily experience* • (1) Tingling sensations on the scalp, the neck, and the arms *Feeling* • (2) Sense of calm • (2) Reduces feelings of stress	(1) Barratt and Davis (2015) (2) Barratt et al. (2017)
9. An examination of personality traits associated with ASMR; B. Fredborg et al. (2017)	*Bodily experience* • Tingling sensations originating in the head and the neck region • Can spread to further parts of the body *Feeling* • Pleasant • Relaxing	—

(*table continues*)

Table 3 (*continued*)

Article, authors	Defining components	References
10. An examination of the default mode network in individuals with ASMR; S. D. Smith et al. (2017)	*Bodily experience* • Tingling sensations on the scalp, the neck, and the back *Feeling* • Positive emotions • Relaxing	Barratt and Davis (2015)
11. An eye-tracking approach to ASMR: The physiology and nature of tingles in relation to the pupil; Valtakari et al. (2019)	*Bodily experience* • Sensation on the skin • Static-like • Tingling sensation originating at the back of the head that spreads down the spine and can spread into the limbs *Feeling* • Positive emotions • Relaxing	Barratt and Davis (2015)
12. An fMRI investigation of the neural correlates underlying the ASMR; Lochte et al. (2018)	*Bodily experience* • (1) Tingling sensation in the scalp *Feeling* • (1) Pleasant • (1) Relaxing • (2, 3) Brain tingles • (2, 3) Brain orgasm	(1) Copeland (2017) (2) Etchells (2016) (3) Marks (2018)
13. ASMR amplifies low frequency and reduces high frequency oscillations; Swart, Banissy, et al. (2022)	*Bodily experience* • Tingling sensations originating at the back of the neck and head, going down the spine and sometimes limbs *Feeling* • Calming • Pleasant	Barratt and Davis (2015)
14. ASMR as idiosyncratic experience: Experimental evidence; Pedrini et al., 2021	*Bodily experience* • Tingling sensations across the scalp that can spread down the spine and the arms, and to further parts of the body *Feeling* • —	Barratt and Davis (2015)
15. AEQ: A data-driven step toward accurately classifying ASMR-responders; Swart, Bowling, et al. (2022)	*Bodily experience* • Tingling sensations at the back of the head and the neck that can spread down the spine and into the limbs *Feeling* • —	Barratt and Davis (2015)
16. Assessing individual variation in personality and empathy traits in self-reported autonomous sensory meridian response; Janik McErlean and Banissy (2017)	*Bodily experience* • (1) Tingling sensation originating on the scalp that spreads down the spine and the whole body *Feeling* • (1) Pleasant • (2) Feelings of euphoria	(1) Barratt and Davis (2015) (2) Cheadle (2012)
17. Atypical functional connectivity associated with autonomous sensory meridian response: An examination of five resting-state networks; S. D. Smith et al. (2019b)	*Bodily experience* • Tingling sensations in the head and neck that spread down into the back and the limbs *Feeling* • Positive affect • Relaxing	Barratt and Davis (2015)
18. Audiovisual model for generating eating sounds using food ASMR videos; Uchiyama and Kawamoto (2021)	—	—

(*table continues*)

Table 3 (*continued*)

Article, authors	Defining components	References
19. ASMR: a flow-like mental state; Barratt and Davis (2015)	*Bodily experience* • (1) Tingling sensation spreading across the skull and down the back of the neck • (1) Static-like *Feeling* • (2) Relaxing • (3) Well-being	(1) Taylor (2013) (2) —
20. Autonomous sensory meridian response: An ineffective long-term therapeutic intervention; Ditchburn and Bedwell (2019)	*Bodily experience* • Tingling sensation starting in scalp and sometimes radiating down the spine and the rest of the body *Feeling* • Pleasant	Barratt and Davis (2015)
21. Autonomous sensory meridian response and the disability resource center: An exploratory review of student perceptions; A. M. Lee (2023)	—	—
22. Autonomous sensory meridian response self-reporters showed higher scores for cognitive reappraisal as an emotion regulation strategy; Morales et al. (2021)	*Bodily experience* • Tingling sensation across the back of the head and neck that can spread down into further parts of the body *Feeling* • Pleasant	Barratt and Davis (2015)
23. Autonomous sensory meridian response: Individual differences and consciousness correlates; Roberts et al. (2021)	*Bodily experience* • Tingling sensation that is head-focused *Feeling* • Comforting • Feelings of euphoria • Pleasant • Relaxing	Barratt and Davis (2015) Roberts et al. (2019)
24. Autonomous sensory meridian response: Scale development and personality correlates; Roberts et al. (2019)	*Bodily experience* • Tingling sensation beginning at the back of the head and traveling down the central nervous system *Feeling* • Comforting • Feelings of euphoria • Pleasant • Relaxing	Andersen (2015) Colizoli et al. (2013)
25. Autonomous sensory meridian response: Sensitivity and personality correlates; Roberts et al. (2020b)	*Bodily experience* • Tingling sensation that is head-focused *Feeling* • Feelings of euphoria • Pleasant • Relaxing	Barratt and Davis (2015) Colizoli et al. (2013) Roberts et al. (2019)
26. Cortical activation changes associated with ASMR: Initial case report; Seifzadeh et al. (2021)	*Bodily experience* • (2) Tingling sensation across the scalp and neck that can spread into the back and the limbs *Feeling* • (1, 2) Feelings of euphoria • (1, 2) Relaxing • (1, 2) Pleasant • (3, 4) Head orgasm	(1) Barratt and Davis (2015) (2) Del Campo and Kehle (2016) (3) Blom and Sommer (2012) (4) Vucic (2020)
27. Dark, loud, and compact sounds induce frisson; Koumura et al. (2021)	*Bodily experience* • Tingling sensation across the scalp and the back of the neck • Electrostatic-like *Feeling* • —	Barratt and Davis (2015)

(*table continues*)

Table 3 (*continued*)

Article, authors	Defining components	References
28. Effect of watching AMR video to heart rate, blood pressure and respiratory rate in students of architectural engineering, universitas Syiah Kuala, Banda Aceh, Indonesia; Idayati et al. (2021)	*Bodily experience* • Tingling sensation originating in the head and the neck that can spread into the peripheral parts of the body • Electricity-like *Feeling* • Calming	G. L. Poerio (2016)
29. Effects of autonomous sensory meridian response on the functional connectivity as measured by functional magnetic resonance imaging; S. Lee et al. (2020)	*Bodily experience* • (1) Tingling sensation in the head and the neck *Feeling* • (2, 3, 4) Anxiety-reducing • (2, 3, 4) Relaxing	(1) Barratt and Davis (2015) (2) Barratt et al. (2017) (3) Cash et al. (2018) (4) G. L. Poerio et al. (2018)
30. Expectancy effects in the autonomous sensory meridian response; Cash et al. (2018)	*Bodily experience* • (1) Tingling sensations originating in the head often spreading to the neck and sometimes other body parts *Feeling* • (2) Increased feeling of content • (2) Relaxing	(1) Barratt and Davis (2015) (2) Taylor (2013)
31. Functional connectivity associated with five different categories of ASMR triggers; S. D. Smith et al. (2020)	*Bodily experience* • (1) Predictable tingling sensation on the scalp and the neck that can spread into the back and the limbs *Feeling* • (1) Positive affect • (1) Relaxing	(1) Barratt and Davis (2015) (2) Barratt et al. (2017) (3) B. Fredborg et al. (2017) (4) G. L. Poerio et al. (2018)
32. Improving mindful attention awareness among Saudi nursing students through autonomous sensory meridian response stimulation; Maniago et al. (2021)	*Bodily experience* • Tingling sensation on the skin • Static-like *Feeling* • Emotionally positive • Relaxing	—
33. Increased absorption in autonomous sensory meridian response; Janik McErlean and Osborne-Ford (2020)	*Bodily experience* • Tingling sensation originating from the head and moving throughout the body • Static-like *Feeling* • Pleasant • Relaxed state	Barratt and Davis (2015)
34. Increased misophonia in self-reported autonomous sensory meridian response; Janik McErlean and Banissy (2018)	*Bodily experience* • (1, 2, 3) Tingling sensation originating on the scalp that spreads down the spine to the limbs *Feeling* • (4) Enjoyable • (4) Relaxing	(1) Barratt and Davis (2015) (2) B. Fredborg et al. (2017) (3) Janik McErlean and Banissy (2017) (4) —
35. Individuals who experience autonomous sensory meridian response have higher levels of sensory suggestibility; Keizer et al. (2020)	*Bodily experience* • (1, 2) Tingling sensation starting in the head and moving downward toward the spine *Feeling* • (3) Brain orgasm • (3) Feelings of euphoria	(1) Barratt and Davis (2015) (2) Barratt et al. (2017) (3) —
36. Induction of relaxation by autonomous sensory meridian response; Sakurai et al. (2021)	*Bodily experience* • (5) Somatosensation on the scalp that can spread into further parts of the body like the spine, the arms, and the legs *Feeling* • (5) Pleasant	(1) Barratt and Davis (2015) (2) Barratt et al. (2017) (3) B. Fredborg et al. (2017) (4) Janik McErlean and Banissy (2017) (5) —

(*table continues*)

Table 3 (*continued*)

Article, authors	Defining components	References
37. Influence of autonomous sensory meridian response on relaxation states: An experimental study; Yusaira and Bennett (2021)	*Bodily experience* • Tingling sensations originating in the scalp that can spread to the neck and into further regions of the body *Feeling* • Brain tingling • Brain orgasm • Static-like	Barratt and Davis (2015)
38. Mindfulness and ASMR; B. K. Fredborg et al. (2018)	*Bodily experience* • Tingling sensations across the scalp, the neck, and the shoulders that can spread into the peripheral parts of the body *Feeling* • Sense of calm • Positive affect	Barratt and Davis (2015)
39. More than a feeling: ASMR is characterized by reliable changes in affect and physiology; G. L. Poerio et al. (2018)	*Bodily experience* • (1) Tingling sensation originating at the top of the head that spreads down into further parts of the body *Feeling* • (1) Calming • (1) Pleasant • (1) Relaxing • (1) Warm • (2) Brain tingles • (2) Brain orgasm	(1) — (2) Oxenham (2016)
40. Possible effect of binaural beat combined with autonomous sensory meridian response for inducing sleep; M. Lee et al. (2019)	*Bodily experience* • — *Feeling* • Psychological Stability • Pleasant	Barratt and Davis (2015)
41. Proximal binaural sound can induce subjective frisson; Honda et al. (2020)	*Bodily experience* • Frisson *Feeling* • Pleasant	—
42. Research on the application of ASMR in the development and design of sleeping products; M. Wang and Li (2020)	*Bodily experience* • — *Feeling* • Relaxing	Liu and Zhou (2019)
43. Sensory channel effects of autonomous sensory meridian response on short-term memory; Kim et al. (2019)	*Bodily experience* • (1, 2, 3) Tingling sensations across the scalp and the back of the neck that can spread into further parts of the body, for example, into the back and limbs *Feeling* • (1, 2, 3) Pleasant • (1, 2, 3) Static-like • (4) Enhanced well-being • (4) Relaxing	(1) Barratt and Davis (2015) (2) S. D. Smith et al. (2017) (3) B. Fredborg et al. (2017) (4) —
44. Sensory determinants of the ASMR: understanding the triggers; Barratt et al. (2017)	*Bodily experience* • Tingling sensation across the scalp that spreads down the spine and the arms, and into further parts of the body • Electrostatic-like *Feeling* • Relaxing	Barratt and Davis (2015)
45. Sexuality versus sensuality: The multimodal construction of affective stance in Chinese ASMR performances; Starr et al. (2020)	*Bodily experience* • Tingling or shivering sensation across the scalp or spreading down the spine *Feeling* • —	Barratt and Davis (2015) G. L. Poerio et al. (2018)

(*table continues*)

Table 3 (*continued*)

Article, authors	Defining components	References
46. Storyscaping in fashion brand using commitment and nostalgia based on ASMR marketing; Chae et al. (2021)	*Bodily experience* • — *Feeling* • Pleasant	Jang et al. (2016)
47. Study on the health application of the snow stepping sound; Tian et al. (2020)	*Bodily experience* • — *Feeling* • Sensory pleasant	—
48. The awesome as well as the awful: Heightened sensory sensitivity predicts the presence and intensity of ASMR; G. L. Poerio et al. (2022)	*Bodily experience* • (2) Tingling sensation beginning at the top of the head and spreading through the body *Feeling* • (1) Emotionally positive • (2) Feelings of euphoria • (2) Relaxing • (2) Trance-like state	(1) Barratt and Davis (2015) (2) Roberts et al. (2019)
49. The effects of ASMR videos on arousal and mood in adults with and without depression and insomnia; Smejka and Wiggs (2022)	*Bodily experience* • Tingling sensation in the scalp moving down to other body parts *Feeling* • Improved mood • Increased Relaxation	Barratt et al. (2017)
50. The impact of different sounds on stress level in the context of EEG, cardiac measures, and subjective stress level: A Pilot Study; Paszkiel et al. (2020)	*Bodily experience* • — *Feeling* • Relaxing	—
51. The influence of autonomous sensory meridian response on individual's executive function; X. Wang et al. (2020)	*Bodily experience* • (1) Tingling, static-like sensation that travels down the spine and other body parts • (1) Static-like *Feeling* • (1, 2) Feelings of euphoria • (1, 2) Relaxing • (3, 4) Brain orgasm • (3, 4) Whisper porn	(1) Barratt and Davis (2015) (2) G. L. Poerio et al. (2018) (3) Beck (2013) (4) Milzoff (2015)
52. Two studies of ASMR: The relationship between ASMR and music-induced frisson; Kovacevich and Huron (2019)	*Bodily experience* • Skin-related tingling *Feeling* • Brain orgasm • Pleasant • Strong feelings	—
53. Untangling the tingle: Investigating the association between the ASMR, neuroticism, and trait and state anxiety; Eid et al. (2022)	*Bodily experience* • Tingling sensation originating from the scalp and neck that can spread into further parts of the body *Feeling* • Deeply relaxing	Ahuja (2013) Barratt and Davis (2015) Tihanyi et al. (2018)
54. Unusual experiences and their association with metacognition: investigating ASMR and tulpamancy; Palmer-Cooper et al. (2022)	*Bodily experience* • (1, 2) Physical tingling sensation across the scalp and the neck *Feeling* • (3) Calming • (3) Positive affect • (4) Pleasant	(1) Barratt and Davis (2015) (2) Roberts et al. (2021) (3) G. L. Poerio et al. (2018) (4) Janik McErlean and Osborne-Ford (2020)

Note. ASMR = autonomous sensory meridian response; AEQ = ASMR-Experience Questionnaire; EEG = electroencephalography; fMRI = functional magnetic resonance imaging.

Palmer-Cooper et al., 2022; G. L. Poerio et al., 2018; S. D. Smith et al., 2019a; Swart, Banissy, et al., 2022). In addition, a sense of psychological stability is named in three cases as defining element of ASMR (Ahn, 2020; Ahn et al., 2019; M. Lee et al., 2019), and in three other cases, a feeling of comfort is described (Roberts et al., 2019, 2020a, 2021). Other experiences that have been described are pleasure or pleasantness (e.g., Ahn, 2020; Ahn et al., 2019; Chae et al., 2021; Honda et al., 2020; M. Lee et al., 2019; Tian et al., 2020) and peace of mind (Jeong, 2020).

In addition to naming the sensory and emotional characteristics of ASMR, the definition of ASMR can only be complete if information is also provided on how ASMR can be triggered. With regard to naming exemplary ASMR triggers in the introduction of the articles retrieved in this systematic review, many authors again refer to a few articles, primarily again Barratt and Davis (2015). When considering the triggers used most often in the studies retrieved, the following pattern emerges: whispering (14), role play (11), tapping (9), personal attention (8), nature sounds (5, see Table 1). However, rather than counting how many studies used a specific trigger, it seems more meaningful to highlight those articles that have explicitly investigated which triggers most reliably elicited ASMR. This has been done in the studies conducted by Barratt and Davis (2015) and Barratt et al. (2017). These authors concluded that complex and lower pitched sounds (Barratt et al., 2017) as well as whispering, personal attention and crisp sounds (Barratt & Davis, 2015) in particular proved to be reliable ASMR triggers.

ASMR Assessment Tools

In terms of the instruments designed to assess ASMR, the systematic search highlighted two different instruments, namely the ASMR-15 (Roberts et al., 2019) and the ASMR-Experience Questionnaire (AEQ; Swart, Banissy, et al., 2022). While the ASMR-15 is a rather conventional questionnaire that assesses the ASMR experience by means of 15 items that can be assigned to different ASMR subfacets (Altered Consciousness, Sensation, Relaxation, Affect), the AEQ is an online questionnaire encompassing 14 different questions related to several ASMR videos. It thus captures an assessment of the ASMR experience directly related to the ASMR videos presented. In addition, a body map is integrated in the AEQ to determine the bodily ASMR experience as accurately as possible. Furthermore, since it appears that not everybody is able to experience ASMR (responder rates vary from 28% to 38%; Roberts et al., 2020a; Swart, Banissy, et al., 2022), the AEQ aims at differentiating people who can experience ASMR (ASMR-responders) from those who cannot (ASMR-nonresponders) offering a classification into five different groups: ASMR-Strong, ASMR-Weak, Control+, Control-, False-Positive. ASMR-strong, and ASMR-weak can be considered as ASMR-responders, and Control+, Control- and False-Positive as ASMR-nonresponders with False-Positive describing those who experience a sensory response to ASMR stimuli that is not in accordance with the typical ASMR characteristics.

While the ASMR-15 presents the 15 items only once, several AEQ items are repeated for each individually presented video. The internal consistency of the ASMR-15 was $\alpha = .78$ in the initial study conducted by Roberts et al. (2019). In studies conducted later, this α value was reached again (G. L. Poerio et al., 2022) or was even exceeded (Morales et al., 2021: $\alpha = 0.90$; Roberts et al., 2020a: $\alpha = 0.92$). For the AEQ, no measure of internal consistency is provided as yet.

Psychological Correlates

Several studies have investigated which personality traits are associated with ASMR using correlational analyses. With regard to the Big Five (Costa & McCrae, 1988), ASMR correlates positively with Openness-to-Experience (B. Fredborg et al., 2017; Janik McErlean & Banissy, 2017; Roberts et al., 2020b) and Neuroticism (Eid et al., 2022; B. Fredborg et al., 2017), but negatively with Conscientiousness (B. Fredborg et al., 2017; Janik McErlean & Banissy, 2017, Roberts et al., 2020b), Agreeableness (B. Fredborg et al., 2017), and Extraversion (B. Fredborg et al., 2017). Besides the Big Five, some other personality related constructs have been linked to ASMR, such as increased sensory processing sensitivity (G. L. Poerio et al., 2022; Roberts et al., 2020b), heightened cognitive reappraisal scores (Morales et al., 2021), higher trait anxiety (Eid et al., 2022), and more pronounced self-rated empathy (Janik McErlean & Banissy, 2017).

Regarding mindfulness, contradictory results emerge in different studies. One study (B. K. Fredborg et al., 2018) shows significantly higher mindfulness-scores in ASMR-responders. In this study, this refers on the one hand to the ability to be aware of and pay attention to the present moment (assessed with the Mindful Attention and Awareness Scale [MAAS]; Brown & Ryan, 2003) and on the other hand to curiosity about sensations, thoughts and emotions that arise when being in a mindful state (Toronto Mindfulness Scale [TMS]; Lau et al., 2006). On the other hand, Janik McErlean and Osborne-Ford (2020) report no correlation between mindfulness and ASMR (for ASMR-responders) while Roberts et al. (2021) report a negative correlation. In both studies, the MAAS was again used.

Given that ASMR is a somewhat complex phenomenon, it is also interesting to investigate how ASMR is related to similar experiences, for example, frisson (i.e., pleasant shivers or chills that can be triggered by movies, music or video games; Kovacevich & Huron, 2019), misophonia (i.e., the negative reaction to specific sound patterns and/or sounds occurring in certain settings or situations; Jastreboff & Jastreboff, 2014) or synesthesia (i.e., the phenomenon of experiencing perceptions in a sensory modality triggered by a stimulus from a different sensory modality; Casini, 2017). Although it is discussed that ASMR is a component of frisson (Koumura et al., 2021) or vice versa (Honda et al., 2020), correlation analyses do not support this assumption (Roberts et al., 2019, 2020a). Examining the association between ASMR and misophonia, inconsistent results emerge, with one study revealing a relationship (Janik McErlean & Banissy, 2018; ASMR-responders), which could not be confirmed in the another study (Roberts et al., 2019; ASMR interest group). No study retrieved in the search conducted for this systematic review examined a possible correlation between ASMR and synesthesia.

Furthermore, until now, when it comes to mere correlational approaches, ASMR experience has not been correlated with any mental health-related variables. However, a number of associations between ASMR and mental health-related variables have been uncovered in the context of short-term interventions, which are presented in the Intervention Studies section.

Neural and Physiological Correlates

Neural Correlates

With regard to the possible neural underpinnings of ASMR, both EEG (seven studies, B. K. Fredborg et al., 2021; M. Lee et al., 2019; Paszkiel et al., 2020; Pedrini et al., 2021; Seifzadeh et al., 2021; Swart, Banissy, et al., 2022; Tian et al., 2020) and fMRI studies (seven studies, S. Lee et al., 2020; Lochte et al., 2018; Sakurai et al., 2021; S. D. Smith et al., 2017; S. D. Smith et al., 2019a, 2019b, 2020) were carried out on the phenomenon. In the ASMR-related EEG studies, recording was always performed during ASMR stimulation. It has not been attempted as yet to obtain a specific EEG resting-state activation pattern for ASMR-responders compared to ASMR-nonresponders. The results appear largely inconsistent so far, with some tentative suggestions of possible decreases in the δ band during ASMR stimulation. In the following paragraphs, the results will be described separately for the different frequency bands with the order of the discussion reflecting the consistency of the evidence addressing the respective frequency band.

Only one study analyzing δ waves, M. Lee et al. (2019) investigating 15 participants and comparing brain activity during ASMR sound stimulation (among other conditions) to a resting-state baseline, yields no changes in δ power during ASMR stimulation. All other four studies (Pedrini et al., 2021; Seifzadeh et al., 2021; Swart, Banissy, et al., 2022; Tian et al., 2020) that explicitly investigated the influence of ASMR on δ power show a decrease in δ activity. However, it has to be noted that both Tian et al. (2020) and Seifzadeh et al. (2021) investigated a very low number of participants (four vs. one). They compared the respective brain activities post-ASMR stimulation to a resting-state period as baseline. Both studies reveal a globally declined δ band. Involving a more sizable number of participants (n = 26), Swart, Banissy, et al. (2022) compared how the EEG pattern differs between a self-reported unchanged state (baseline) compared to self-reported ASMR experience, yielding a decrease of δ specifically in prefrontal areas. Finally, Pedrini et al. (2021) compared brain activity while watching ASMR videos not only to a resting-state condition as baseline but also to brain activity while watching

three different other video types (high arousal, low arousal, control; $n = 76$). Interestingly, they show lower δ values for watching ASMR videos compared to the three other video types used, but not in comparison to the resting-state condition.

α waves were assessed in seven studies (B. K. Fredborg et al., 2021; M. Lee et al., 2019; Paszkiel et al., 2020; Pedrini et al., 2021; Seifzadeh et al., 2021; Swart, Banissy, et al., 2022; Tian et al., 2020). The previously mentioned studies by Tian et al. (2020) and Seifzadeh et al. (2021) involving very small sample sizes reveal a significant α increase post-ASMR versus resting state (Seifzadeh et al., 2021, especially in the central region). However, Seifzadeh et al. (2021) also report an α band power decrease in the occipital region. Again involving a small sample ($n = 9$), Paszkiel et al. (2020) used music triggering ASMR and compared it to three different conditions during which EEG recordings were carried out (relaxing music, rap music, and silence). Additionally, they included a phase during which a stressor was applied, with silence serving as the baseline condition. They state that the Mean α Wave Amplitude Value (calculated comparing the difference between the "music listening phase" and the "stressor phase" to the phase before the measurement) is significantly higher during the ASMR-triggering condition and the relaxing music condition compared to the rap music condition and silence. This means that ASMR and music can relax participants even to a calmer state than before the stressor.

For the studies with larger sample sizes ranging between $n = 15$ and $n = 76$, an inconsistent pattern of results emerges with regard to α waves (two studies suggesting an increase and two studies a decrease of α waves): Swart, Banissy, et al. (2022) reveal a global increase in α power during the self-perceived ASMR experience (ASMR compared to baseline). B. K. Fredborg et al. (2021) conducted an EEG study contrasting ASMR audio-only stimuli as well as ASMR audiovisual stimuli with control audio as well as with a pre-ASMR stimulation phase (baseline). With regard to both contrasts, they report significant increases in α power for ASMR-responders when ASMR audios were used, but in different regions (for the contrast with control audio: especially near the left cuneus and in frontal areas; for the contrast with pre-ASMR stimulation: in broad frontal areas, right medial frontal regions and left medial frontal regions). Remarkably, however, two findings involving sample sizes ranging between $n = 15$ and $n = 76$ appear contradictory with regard to α waves: Pedrini et al. (2021) found that ASMR videos were associated with lower α compared to two other video types used (low arousal, control). M. Lee et al. (2019) showed a decrease of α power for both ASMR and binaural beat as well as for a combination of binaural beat and ASMR compared to a sham condition (silent stimulus, baseline).

With regard to theta waves (assessed by B. K. Fredborg et al., 2021; M. Lee et al., 2019; Pedrini et al., 2021; Seifzadeh et al., 2021; Swart, Banissy, et al., 2022; Tian et al., 2020), most studies—three studies with sample sizes between $n = 15$ and $n = 28$ (B. K. Fredborg et al., 2021; M. Lee et al., 2019; Swart, Banissy, et al., 2022) and one case study (Seifzadeh et al., 2021)—find no associations with increases or decreases in theta power. However, in the study by Pedrini et al. (2021) including 76 participants lower theta values are reported for ASMR videos compared to one other video condition (low arousal). Also, Tian et al. (2020), including a small sample size, report a decrease of theta waves during ASMR stimulation.

In terms of β waves, which were assessed in the studies by M. Lee et al. (2019), Pedrini et al. (2021), Seifzadeh et al. (2021), Swart, Banissy, et al. (2022) and Tian et al. (2020) again contradictory results emerge. The two studies involving very small sample sizes (Seifzadeh et al., 2021; Tian et al., 2020) report a (general) increase in the β band frequency. Pedrini et al. (2021), on the other hand, report associations between ASMR and lower low (but not high) β values compared to all other video types. For the other studies, with regard to the β waves, no difference emerges between ASMR and the respective baseline conditions (M. Lee et al., 2019; Swart, Banissy, et al., 2022).

γ waves were assessed by B. K. Fredborg et al. (2021), M. Lee et al. (2019), Pedrini et al. (2021), Seifzadeh et al. (2021) and Swart, Banissy, et al. (2022). Again, contradictory results emerge. Comparing ASMR to the control audios, B. K. Fredborg et al. (2021) identify a significant increase in γ power (only for ASMR participants). Also, the single case study by Seifzadeh et al. (2021) shows increased γ post-ASMR stimulation in comparison to pre-ASMR stimulation (central region, frontoparietal regions). Pedrini et

al. (2021) report lower γ values during ASMR compared to two other videos used (low arousal, control). M. Lee et al. (2019) and Swart, Banissy, et al. (2022), on the other hand, state that γ wave activity did not differ during ASMR stimulation compared to the other content used (M. Lee et al., 2019) or compared to the baseline condition (Swart, Banissy, et al., 2022).

With regard to the fMRI investigations related to ASMR, according to our systematic search, a total of seven relevant studies were retrieved, with two different methodological foci: Either attempting to uncover a link between specific, isolated brain areas with ASMR stimulation (Lochte et al., 2018; Sakurai et al., 2021; S. D. Smith et al., 2019a) or investigating functional connectivity between multiple brain areas (S. Lee et al., 2020; S. D. Smith et al., 2017; S. D. Smith et al., 2019b; S. D. Smith et al., 2020).

With regard to the link between ASMR sensation and specific brain areas, it should first be mentioned that in the study by Sakurai et al. (2021) no ASMR experience occurred during ASMR stimulation, meaning that no conclusions can be made about the relationship between ASMR experience and specific brain areas. For the remaining two studies, it can be summarized that Lochte et al. (2018) involved ASMR stimulation with the participants identifying specific episodes of relaxation and tingling. S. D. Smith et al. (2019a) contrasted ASMR stimulation induced by ASMR videos with control videos which were not likely to elicit ASMR. While Lochte et al. (2018) only tested ten ASMR-responders (without implementing a control group), S. D. Smith et al. (2019a) compared 17 ASMR-responders with 17 age- and sex-matched controls. Even though both studies used different contrasts and different methodological approaches, it is still evident that for ASMR-responders, both studies reveal associations between ASMR and the anterior cingulate gyrus, as well as between ASMR and movement-related regions. Thus, at least some indication of reliability of the findings is provided.

With regard to the functional connectivity, ASMR-responders appear to exhibit lower functional connectivity in numerous networks when compared to ASMR-nonresponders (e.g., the salience network, the visual network and the default mode network; S. D. Smith et al., 2017; S. D. Smith et al., 2019b). Moreover, during ASMR stimulation, functional connectivity can apparently be altered between different brain areas (e.g., between the posterior cingulate cortex and the superior temporal gyrus; S. Lee et al., 2020), with increased functional connectivity being revealed when a seed-based analysis was used (S. Lee et al., 2020) and decreased functional connectivity when using an independent-components analysis technique (S. D. Smith et al., 2020). In the study by S. D. Smith et al. (2020), differences in functional connectivity are associated with sensitivity differences to different ASMR triggers.

Physiological Evidence

To find out whether there are physiological markers associated with watching ASMR videos or listening to ASMR audios, several experimental studies have been conducted, and some diversity in the assessments has already emerged. It was shown that ASMR is associated with a decrease in heart rate (Ahn et al., 2019; Ahn, 2020; Idayati et al., 2021; Paszkiel et al., 2020; G. L. Poerio et al., 2018), a reduction of blood pressure (Ahn et al., 2019; Ahn, 2020; Idayati et al., 2021; Paszkiel et al., 2020), and an increase in pupil diameter (Pedrini et al., 2021; Valtakari et al., 2019). In the study by G. L. Poerio et al. (2018), it was also revealed that skin conductance level was increased while watching ASMR videos for ASMR-responders but not for ASMR-nonresponders. Only one study investigated the respiratory rate while watching ASMR videos without being able to show an effect (Idayati et al., 2021).

Intervention Studies

When it comes to short-term interventions presenting ASMR stimuli on only 1 day, ASMR appears to have an influence on several mental health-related aspects. For example, ASMR is associated with improved mood scores (Smejka & Wiggs, 2022; in ASMR-responders), increased pleasant affect (G. L. Poerio et al., 2018; in ASMR-responders), and decreased state anxiety (Eid et al., 2022; in ASMR-responders). In contrast, Yusaira and Bennett (2021) report on ASMR being associated with a decrease of positive feelings like joy or love and with more sleepiness. Importantly, in this study, no distinction between ASMR-responders and

nonresponders could be made. Again not differentiating between ASMR-responders and nonresponders, M. Lee et al. (2019) state that ASMR stimulation was related to improvements of psychological stability (e.g., less anger, more calmness, more happiness). Sakurai et al. (2021), examined only participants who did not experience ASMR, reporting that stimulation with ASMR audios was not related to higher comfort related mood scores.

With regard to short-term interventions investigating cognitive functions, ASMR has been linked to improved short-term memory scores in a sample not distinguishing between ASMR-responders and nonresponders (Kim et al., 2019, only when auditory stimuli were presented), but also to reduced set shifting and inhibition abilities (executive functioning) in ASMR-responders (X. Wang et al., 2020). These results show that some cognitive functions might benefit from an ASMR stimulation, but on the other hand, ASMR could also have a negative effect on higher order executive control functions.

Another construct that has been investigated in a short-term intervention study is mindfulness. Maniago et al. (2021)—who again used the MAAS which was also employed in mindfulness correlation studies—compared the effects of different ASMR triggers. They found that whispering and auditory ASMR triggers are associated with higher mindfulness scores compared to personal attention triggers.

To date, there is only one ASMR intervention study that has repeatedly exposed participants to ASMR stimuli repeatedly across several days (Ditchburn & Bedwell, 2019). In this study, healthy participants watched ASMR videos for 10–30 min every day for 1 week. Two groups were compared: One watching mindfulness videos and a passive control group where no intervention was implemented. As outcome measures anxiety, depression, and psychological well-being were assessed. Compared to the control groups, no significant improvements were revealed in the ASMR group. Consequently, even though first indications emerge that ASMR can be associated with short-term improvements in mental health-associated domains, there is no evidence so far that ASMR is also associated with mid- or long-term effects which could best be detected in comprehensive randomized controlled trials.

Discussion

Evaluation and Interpretation of the Results

Definition and Assessment Tools

As stated in the results section, when defining ASMR the majority of articles refer to Barratt and Davis (2015). However, a lot of authors deviate from the original description of ASMR provided by Barratt and Davis in several ways. Unlike Barratt and Davis' original description, the ASMR experience is mostly not described as a phenomenon that takes place on the skin (only four more articles include the specification of a skin-related localization of the ASMR experience: Kovacevich & Huron, 2019; Maniago et al., 2021; Rouw & Erfanian, 2018; Valtakari et al., 2019) and the body parts on which the ASMR sensation occurs sometimes differ from the ones named by Barratt and Davis (2015).

The other definitional components which refer to the feelings associated with ASMR (e.g., psychological stability, calmness, euphoria), described in other articles than that by Barratt and Davis (2015) and presented in the results section, have a rather vague character. However, this is also the case for relaxation or well-being (being related to ASMR) as described by Barratt and Davis (2015) and therefore these terms might as well be under consideration when it comes to a more comprehensive ASMR definition.

With regard to the triggers that elicit ASMR, there is definitely also a need for further specification. For example, nearly all findings on the topic of ASMR triggers conducted so far have been obtained on the margins of other research questions, and there is only one study that exclusively addressed ASMR trigger evaluation (Barratt et al., 2017). A major problem in the systematic evaluation of ASMR triggers is that people who experience ASMR obviously react very differently to triggers, so that even in the future it will hardly be possible to provide generally valid information about potential reliable ASMR triggers. In addition, people may not respond identically to specific ASMR triggers at all times during the day or depending on their emotional state, thus further complicating scientific evaluation. Nevertheless, it is important to broaden the knowledge gained so far with regard to reliable ASMR triggers on the basis of larger samples in order to derive further at least

probability-based conclusions about which triggers are most likely associated with ASMR. In addition, critically, ASMR triggers have so far been considered in an isolated manner, that is independently of the person interacting with the triggers. An attempt should be made to evaluate whether the trigger effectiveness is influenced by the person who is trying to trigger the ASMR in another person. Possible relevant factors could be: gender, sympathy, professionalism, variety in interaction with the stimulus, etc.

Discussing the instruments that are supposed to assess ASMR, it can first be stated that the ASMR-15 and the AEQ have both their strengths and weaknesses. The ASMR-15 does not take a lot of time, is very flexible, can be conducted either online or offline and can always be applied to new ASMR videos. The AEQ can determine much more precisely which parts of the body are affected by ASMR. Furthermore, the AEQ was especially designed to distinguish between people who experience ASMR and those who do not.

A potential shortcoming of the ASMR-15 is that, overall, it may not evaluate the ASMR experience specifically enough: Only a few items refer to the core ASMR experience defined in the results section, while many of the items are nonspecific (e.g., "I feel relaxed"). Another critical aspect in relation to the ASMR-15, which could, however, be resolved by a small adjustment by the authors, is that the instruction of the ASMR-15 in its current form may be too short: it refers exclusively to nonspecific sounds ("When I hear certain sounds, such as whispering, crinkling, tapping"). Consequently, it does not relate to a social component that is inherent in most ASMR videos. Correspondingly, a study conducted by Lohaus et al. (2023) suggests that social cues might indeed play an important role in generating the ASMR experience. The study showed that ASMR videos (obviously associated with a social component with the ASMR performer being seen throughout the videos) are associated with significantly more ASMR experience than the so-called walking tour videos in which the social component is less prominent. In walking tour videos, people film their walk-through different locations from a first-person perspective and allow the viewer to participate. Comparable to ASMR videos, they also contain sounds that could potentially be experienced as pleasant, such as rustling leaves, rain, or urban sounds. Correspondingly, Shimokura (2022) demonstrated that human-generated sounds are more likely to induce ASMR when compared to nature-generated sounds again hinting at the importance of a social component of ASMR content for the generation of ASMR.

Furthermore, the ASMR-15 leaves out a visual component, although it has been shown in a preprint by Tada et al. (2021) which was excluded in the results section due to specifications made after the systematic search that the combination of video and audio ASMR content is more likely to trigger ASMR compared to audio-only stimuli. A shortcoming of the AEQ, on the other hand is that the selection of integrated ASMR videos could be much more versatile, with certain types of ASMR triggers being left out, while other types of ASMR triggers are overrepresented.

Although the ASMR-15 and the AEQ appear to be reliable and valid instruments to assess ASMR, in fact, the previous studies rarely incorporated these instruments. Seven studies retrieved in this systematic review included the ASMR-15 (Morales et al., 2021; Pedrini et al., 2021; G. L. Poerio et al., 2022; Roberts et al., 2019, 2020a, 2020b, 2021) and only two (Swart, Banissy, et al., 2022) the AEQ. It is important to note, however, that several of the studies were conducted when the questionnaires did not yet exist (the first study on ASMR-15 was published in 2019, Roberts et al., 2019; the first study involving the AEQ in 2021, Swart, Bowling, et al., 2022). In designing future studies, the two assessment tools presented in this systematic review should be used more frequently and should be adapted to ensure that ASMR experience is appropriately operationalized.

Psychological Correlates

Regarding the association between ASMR and personality, the main focus in research so far has been on the Big Five (Costa & McCrae, 1988), which certainly provides good initial evidence, but only partially circumscribes the multifaceted personality of human individuals. Other, more comprehensive measures of personality that could be correlated with ASMR are, for example, the Sixteen Personality Factor Questionnaire (Cattell & Mead, 2008; involving additional personality factors such as warmth, sensitivity or tension) and the more clinically oriented Minnesota Multiphasic Personality Inventory

(Butcher, 2010; involving e.g., social introversion). While there is preliminary (albeit contradictory) evidence regarding a relationship between ASMR and mindfulness, the relationship between ASMR and the ability to engage in other techniques associated with relaxation such as yoga, PMR, and AT remains unexplored. It would be particularly interesting to know whether people who use other relaxation techniques are also ASMR-responders, or whether ASMR content might be an alternative for people who have not had success with other relaxation techniques before.

Concerning other constructs related to ASMR, the findings indicate that it is not always clear how to distinguish ASMR from other constructs (frisson, misophonia, synesthesia). In the systematic search for this review, no study was revealed that associated ASMR with synesthesia. However, since there is obvious overlap between ASMR and synesthesia (e.g., the fact that they are both multisensory phenomena, each triggered by specific stimuli), it is currently discussed that ASMR might be driven by synesthetic mechanisms, but more research is still needed to examine the extent to which the two constructs can be distinguished from each other (G. Poerio et al., 2022). With future investigations of what characterizes ASMR more specifically, more insights on the association between ASMR and similar constructs will be generated.

Furthermore, until now there are no studies examining the relationship between ASMR and social cognition, apart from empathy. However, given that social cues might be important for triggering ASMR (see Definition and Assessment Tools section), this would definitely be interesting to be investigated in more detail. For example, a link between ASMR experience and data obtained via emotion recognition instruments (e.g., the Geneva emotion recognition test by Schlegel et al., 2014), and also Theory of Mind (ToM) instruments (e.g., the "Reading the Mind in the Eyes" Test by Baron-Cohen et al., 2001) or instruments assessing social problem solving (e.g., the social problem-solving task by Channon & Crawford, 2010) would be conceivable.

Neural and Physiological Evidence

In summary, with regard to neural and physiological underpinnings of ASMR, it can be stated that promising initial evidence has already been gained via EEG, fMRI, and physiological measures. Although EEG findings are rather heterogeneous, several studies tentatively suggest δ wave decreases in association with ASMR. Furthermore, there are fMRI backed associations between ASMR experience and activations of the anterior cingulate gyrus as well as movement-related brain areas (which could also be shown in at least two independent studies), atypical functional connectivity patterns as well as physiological changes such as heart rate reduction.

With regard to the EEG related findings, it is not obvious why a δ-wave decrease occurs in several studies, especially since δ-waves have until recently been associated with deep sleep in particular (Dang-Vu et al., 2005). However, δ-waves also relate to consciousness (Frohlich et al., 2021)—perhaps those states of consciousness that are associated with relaxation, since a corresponding δ-wave decrease has also been shown during meditation (Young & Taylor, 1998). Despite these interesting first implications regarding EEG data, there are several methodological concerns that have to be resolved in future studies. It should, for example, be noted that not all typically investigated EEG frequency bands were examined in all studies, clearly biasing the report. Furthermore, in one study only a single participant was included (Seifzadeh et al., 2021). Moreover, in one case, the overall quality of the article is to be regarded as very low (score = 1 out of 11) according to risk of bias and quality analysis (Tian et al., 2020). It should also be noted that in the EEG studies, the distinction between ASMR-responders and ASMR-nonresponders was only implemented in the study by B. K. Fredborg et al. (2021).

With regard to the reliable associations between specific brain areas and ASMR, the emerging pattern of results does not yet provide enough informative value. Regarding the anterior cingulate gyrus, it appears to be difficult to interpret why it might be associated with ASMR experience. One possible reason could be (since the anterior cingulate gyrus has been linked to the salience network) that the anterior cingulate gyrus facilitates attention processes related to an external stimulus the ASMR experience is usually associated with (S. D. Smith et al., 2019a). The fact that motoric regions of the cortex are activated during ASMR experience suggests that ASMR is rather a sensorimotor, and not a

psychosomatic phenomenon (S. D. Smith et al., 2019a). Future studies should examine in more detail whether there are other specific brain areas or parts of brain areas associated with ASMR, as the brain area pattern described in this systematic review appears rather nonspecific. Also, it should be elucidated further how functional connectivity patterns are altered with ASMR experience, potentially in associations with interindividual differences in sensitivity to ASMR triggers (S. Lee et al., 2020; S. D. Smith et al., 2017; S. D. Smith et al., 2019b).

With regard to the physiological markers and ASMR, the most pronounced effect of ASMR reducing heart rate appears very plausible considering its relaxation potential. Still, it must be stated that other important physiological markers have not been investigated at all so far (e.g., heart rate variability or cortisol levels) or have only very rarely been investigated (e.g., respiratory rate or skin conductance level). Furthermore, several methodological issues must be considered in the future: In three studies presented in the results section, it is not stated whether the heart rate decrease was statistically significant (Ahn et al., 2019; Ahn, 2020; Paszkiel et al., 2020), and the study conducted by Idayati et al. (2021) did not involve a control group or control condition. Blood pressure reduction was addressed in the same four studies with the described methodological shortcomings.

Intervention Studies

First, but still limited and sometimes contradictory evidence for the short-term effects of ASMR particularly on various mental health variables (e.g., mood, Smejka & Wiggs, 2022) was revealed. Given the pattern of results, it is evident that short-term ASMR effects are to be expected for ASMR-responders in particular (Eid et al., 2022; G. L. Poerio et al., 2018; Smejka & Wiggs, 2022). If, on the other hand, no distinction is made between ASMR-responders and ASMR-nonresponders or only ASMR-nonresponders are included, two out of three studies (Sakurai et al., 2021; Yusaira & Bennett, 2021) show no positive short-term effects of ASMR on mental health-associated outcomes.

Moreover, it must be stated at this point that several mental health-related domains have not been investigated as yet, both in terms of typical psychopathological symptoms (e.g., in relation to more specific anxiety-related domains such as panic disorder or social anxiety as well as somatization etc.) and in terms of positive psychological constructs (e.g., quality of life and meaningfulness).

Also, first evidence emerged concerning a possible short-term influence of ASMR on cognitive domains. Associations with improvements in short-term memory performance might be explained by the fact that there is a link between positive emotions and learning/memory with ASMR-triggering positive emotions (Kim et al., 2019). The negative relationship between ASMR and executive functioning could be due to the fact that the positive emotions associated with ASMR may inhibit executive functioning. Without involving ASMR, the inhibitory effect of positive emotions on executive function has, for example, been shown for the Stroop test (Phillips et al., 2002), which was also used in the study revealing the negative relationship between ASMR and executive functioning (X. Wang et al., 2020).

Importantly, one aspect that has hardly been investigated so far relates to the mid- and long-term effects of ASMR on various psychological domains. The only intervention involving repeated ASMR stimulation for 7 days shows clear limitations (Ditchburn & Bedwell, 2019). For example, the ASMR videos in this study have not been comprehensively preevaluated. Furthermore, it was not possible to switch between different ASMR videos at any time during the intervention and to choose from a larger pool of videos, although this seems very important due to the large interindividual differences in terms of the suitable triggers. In addition, in the aforementioned intervention study, the time span of the intervention was rather short (1 week) and no follow-up investigation was conducted. Furthermore, a comprehensive evaluation of appropriate control stimuli that can be used in comparison with ASMR stimuli has not yet been carried out, so that until now the choice of control stimuli to be used as a comparison to ASMR stimuli seems to be rather arbitrary. Most importantly, in the study by Ditchburn and Bedwell (2019), no distinction was made between ASMR-responders and ASMR-nonresponders, although evidence suggests that consideration of responder type is important, as results may differ fundamentally between ASMR-responders and ASMR-nonresponders (see

e.g., Lohaus et al., 2023). Future studies ought to address these shortcomings when it comes to evaluating whether or not ASMR stimulation can be regarded an effective mid- or long-term intervention tool.

Limitations of Evidence

With regard to the limitations of evidence, several weaknesses appear in a number of studies/articles. A quantitative overview of the quality of the studies/articles can be found in Table 2. Considering Table 2, it becomes clear that the following aspects in particular need to be critically discussed with regard to the retrieved studies/articles: Often it remains unclear, which inclusion criteria were applied making it difficult to judge whether the findings that already exist with respect to ASMR are generalizable or only relate to a very specific sample. Confounding factors were rarely mentioned or dealt with (e.g., the presence of additional conditions that may be difficult to distinguish from ASMR such as goose bumps or frisson). Moreover, clearly differentiated hypotheses, which are referred to in the course of the articles, were rarely stated. On the other hand, as can be inferred from Table 2, strengths of the majority of studies/articles involve the outcomes being measured in a valid and reliable way, appropriate statistical analysis being used and the main results of the study being immediately identifiable from the abstract.

It should be noted that a relatively short instrument (with 5 out of the 11 items assessing the writing of the article, but not the research conducted) was used for the assessment of risk of bias in order to keep the amount of ratings within a manageable range, although other instruments exist that evaluate risk of bias even more comprehensively and could have also been used for the evaluation of the ASMR studies with minor adaptations (e.g., the Appraisal tool for Cross-Sectional Studies; Downes et al., 2016). This could have made the evaluation of risk of bias even more precise. Furthermore, the evaluation of certainty assessment, which is included in several PRISMA-guided reviews, was omitted for the assessment of limitations of evidence, as the commonly used Grading of Recommendations Assessment, Development and Evaluation approach operates at an outcome level (Balshem et al., 2011), with the outcomes being so diverse in this review that no meaningful overview could have been achieved. Nevertheless, our chosen approach—especially in combination with the items on article quality added by the research team—provides a good overview evaluating which ASMR-related studies/articles already meet important criteria with regard to methodological quality.

Apart from the results regarding methodological quality of the studies/articles already presented in Table 2, in terms of the study design, several additions can be made that are not applicable to all studies and have thus been omitted from the rating conducted in relation to Table 2. First, it has to be pointed out that blinding approaches have hardly been described in the reviewed studies. Only in two studies, a single-blind procedure was implemented (Maniago et al., 2021; Yusaira & Bennett, 2021), and in one study, a double-blind approach was followed (Idayati et al., 2021). It is also not apparent from any of the articles uncovered in this systematic review that subjects were initially blinded to the study or study condition and then unblinded as they progressed. Furthermore, experimenter-induced bias was discussed and dealt with in only one article (Swart, Banissy, et al., 2022). Therefore, even beyond the results presented in Table 2, there is further reason to believe that future ASMR studies can be significantly improved with regard to their study designs.

Furthermore, it should be considered that so far, classifications into ASMR-responders and ASMR-nonresponders have exclusively been based on self-assessments, as no objective operationalization of ASMR-responders and ASMR-nonresponders (e.g., via EEG or fMRI) is available yet. In the studies discussed in this systematic review, the usual procedure used to classify ASMR-responders and ASMR-nonresponders was to show one or more ASMR videos, followed by a questionnaire, a single item, or verbal questions that were meant to gauge the ability to experience ASMR (Eid et al., 2022; B. Fredborg et al., 2017, 2018; B. K. Fredborg et al., 2021; Liu & Zhou, 2019; G. L. Poerio et al., 2018; G. L. Poerio et al., 2022; S. D. Smith et al., 2017; S. D. Smith et al., 2019a, 2019b; Valtakari et al., 2019; X. Wang et al., 2020). In a few studies, the presentation of an ASMR video prior to an ASMR questionnaire/interview was not included, meaning that

participants were not able to directly verify whether or not they were experiencing ASMR, but were only asked to assess their expectations based on a description of ASMR (Janik McErlean & Banissy, 2017; Janik McErlean & Banissy, 2018; Janik McErlean & Osborne-Ford, 2020; Morales et al., 2021; Palmer-Cooper et al., 2022). In these cases, misclassification is likely to have occurred more frequently than in the studies in which one or more ASMR videos were shown before the self-report. Therefore, in future studies, until a more objective way of classification into ASMR-responders and non-ASMR-responders is possible, it should be ensured that the self-report is as comprehensive as possible and that participants can immediately self-evaluate their ASMR experience by always showing at least one ASMR video (which would e.g., be warranted when using the AEQ).

One general aspect that is frequently discussed with regard to ASMR and might have an impact on the evidence uncovered to date but has rarely been scientifically investigated is the link between ASMR and expectancy effects. The notion that viewing ASMR videos is associated with expectations to feel a characteristic ASMR experience is suggested by the study of Cash et al. (2018), showing that people who have never watched an ASMR video are highly manipulable via an ASMR instruction that predicts a characteristic ASMR feeling. By contrast, experienced ASMR video consumers are not manipulable, suggesting that the role of expectancy effects in relation to ASMR might be rather complex, is not yet fully clarified and should thus be evaluated in future studies examining ASMR.

Overall, we conclude that, because ASMR research is still in its infancy, there are still some uncertainties regarding the adequate operationalization of ASMR (e.g., self-report only and possible influence of expectancy effects) that should be considered in future research. In addition, not all ASMR-related research meets high scientific standards. Thus, the results and interpretations are to be treated with caution (see Table 2), although no particularly contradictory or questionable findings from these studies were uncovered during the preparation of the systematic review. Apart from the more general problems related to the ASMR operationalization, this systematic review shows that studies related to ASMR have presented interesting, diverse results that warrant further scientific evaluation of ASMR.

Limitations of Our Systematic Review

In addition to the limitations of our systematic review with respect to the assessment of the limitations of evidence, which have already been discussed in the previous section, two more general issues will be presented at this point. First of all, the inclusion criteria for the review were very broad, so that (pretty much) all studies that have been conducted so far with regard to the topic of ASMR were initially included. This way, an initial general overview is achieved for readers who are interested in ASMR research, but it also means that some study results could not be discussed at all to keep the overview focused and precise. Even articles of rather poor methodological quality were included. The decision to keep the articles as a part of the systematic review was made since even if the overall methodological quality of certain articles is not considered particularly high, these articles were still undergoing peer-review, may inspire future ASMR researchers in terms of their research and can still contribute to the evaluation of ASMR in a descriptive manner (e.g., Table 3).

Furthermore, despite the broad scope of the systematic review, it is still possible that individual studies are not included in this review, for example, due to lack of publication of nonsignificant findings. No estimate for publication bias could be determined in the course of the preparation of the systematic review. Overall, however, our systematic review still provides a comprehensive initial overview of the ASMR phenomenon. The fact that ASMR is one of the most searched terms on YouTube and thus on one of the most visited websites on the internet reflects the massive worldwide interest in ASMR. The scientific community must not sleep on this trending topic and should conduct more fundamental research as well as intervention studies with regard to this phenomenon, taking into consideration this systematic review, which provides an overview of current ASMR research.

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