Still more than a feeling: Commentary on Cash *et al.*, "Expectancy effects in the Autonomous Sensory Meridian Response" and recommendations for measurement in future ASMR research.

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T.H. and G.P. conceived of and developed the presented idea and contributed equally. T.H., G.P., & E.B. all contributed to the content and writing of the manuscript.

ABSTRACT

Autonomous Sensory Meridian Response (ASMR) – the sensory phenomenon experienced by some people in response to visual and auditory stimuli such as whispering – has attracted substantial public attention but is not yet well-understood or well-established within the scientific community. Recent research published in *PeerJ* by Cash, Heisick, & Papesh (2018) investigated whether ASMR could be a placebo effect (resulting from expectation) rather than a genuine experience triggered by ASMR-inducing stimuli. In this article, we provide a commentary on Cash *et al.*'s findings and argue that they provide evidence *for* (rather than against) the veracity of ASMR. We discuss issues regarding measurement of ASMR and end by providing some recommendations on how to assess ASMR as both a state and a trait, in the hope of galvanising collaborative research efforts in the emerging field of ASMR.

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INTRODUCTION TO ASMR

Autonomous Sensory Meridian Response (ASMR) is a sensory experience characterised by involuntary tactile tingling sensations originating in the scalp which are accompanied by feelings of relaxation (Poerio et al., 2018). The sensation occurs in some people in response to audio, visual, and tactile triggers which commonly include: whispering, close personal attention, tapping, and slow hand movements (Barratt & Davis, 2015; Barratt et al., 2017; Fredborg et al., 2017; Poerio et al., 2018). Although people with ASMR report experiencing the feeling since childhood (Poerio, 2016), public awareness of the phenomenon has burgeoned in recent years due to the proliferation of online ASMR videos created to induce the sensation 'on demand' (Poerio, 2016). Many ASMR experiencers report using these videos as a sleep-aid and to alleviate symptoms of anxiety and depression (Barratt & Davis, 2015). Despite this, there are currently very few published scientific studies which examine ASMR, its veracity, and potential therapeutic benefits.

Is ASMR a real or placebo effect?

In a recent article published in *PeerJ*, Cash, Heisick, and Papesh (2018) sought to determine "whether it [ASMR] truly exists, or rather is a product of individual expectations" and "may represent a placebo

effect" (p.3). Specifically, the aim of their study was "to assess whether ASMR is affected by individuals' expectations or if the phenomenon emerges regardless of expectations." (p. 4). This is a timely and important question given the emergence of ASMR research: If ASMR can be explained entirely by expectation, then future costly and time-consuming research into biological causes of ASMR could be unwarranted or even unethical (Boot et al., 2013).

The experiment: manipulating expectation in ASMR and non-ASMR participants

Cash *et al*. tested two groups of participants: ASMR participants who experience the sensation (recruited from ASMR discussion boards), and naïve non-ASMR participants who do not (a post-experimental assessment showed they had no previous exposure to ASMR clips). Participants were presented with audio clips featuring: 1) ASMR content from YouTube including several common triggers; 2) perceptually similar "foils" or control clips (e.g. finger drumming), and 3) a control music clip. Participants rated the extent to which they experienced ASMR after each clip from 1(not at all) to 7(a great deal). The experience of ASMR was described to participants as "a pleasant tingling, static-like sensation in response to listening to specific audio or visual stimuli" (p. 6). The key experimental manipulation designed to test the role of expectancy effects was the instruction given to participants before listening to the clips. In the *encouraging* condition, participants were told that *all* of the clips had been shown to induce ASMR, and the experiment sought to determine the 'causal mechanisms' of the effect; in the *discouraging* condition, participants were told that *none* of the clips had been shown to induce ASMR, and that the purpose of the experiment was to determine audio-visual characteristics that prevent ASMR from occurring.

The results: Naïve, but *not* ASMR participants are susceptible to the expectancy manipulation

Cash *et al*.'s primary finding was that naïve non-ASMR participants were susceptible to the expectancy manipulation, but ASMR participants were not. Naïve participants reported significantly higher ASMR ratings when they were encouraged, rather than discouraged, to think that the clips induced ASMR. However, ASMR participants were immune to the expectation manipulation: their ASMR ratings did not differ depending on whether they were encouraged or discouraged to think that the clips induced ASMR. Further analyses showed that ASMR participants, but not naive participants, had significantly different ratings for different clip types (irrespective of the manipulation): ASMR participants rated ASMR clips as significantly more ASMR-inducing compared to both the foil and music clips whereas naive participants' ratings were similar for all clip types. This overall pattern of responses is represented in Figure 1.

IS ASMR A PLACEBO EFFECT?

Cash *et al*. interpret the observed Group (ASMR vs. naive participant) X Instruction (encouraging vs. discouraging) interaction: "we found that ASMR users were immune to our expectation manipulation, but naïve users experienced ASMR when they were told to expect it and did not experience ASMR when told not to expect it" (p.4). However, their overall conclusion in the discussion was that "[the] findings support expectancy effects from both experienced ASMR users and naïve participants" (p.12). This conclusion is based on the Clip (ASMR vs. foil vs. music) X Group (ASMR vs. naïve participant) interaction where ASMR participants rated foil and music clips as *less* ASMR-inducing than naive participants, regardless of instruction. They interpret these findings as showing that "[ASMR participants] were affected by their own expectations, driven by their history of ASMR viewing or participation in ASMR discussion boards" (p.11). The suggestion here is that ASMR participants were affected by their *own* expectations to report *reduced* ASMR to *non*-ASMR clips, implying that their personal expectations overrode the experimentally induced expectancy manipulation: "ASMR users either recognized the ASMR clips, or were familiar enough with the characteristics of "real" ASMR media to report effects consistent with their expectations (i.e. intentionally reporting lower ASMR ratings)." (p.11).

An alternative explanation

Examining the entire set of observed results, we diverge from Cash *et al*.'s conclusions from the experiment. Rather than demonstrating that ASMR occurs from expectancy (induced or pre-existing), our interpretation is that their experiment provides convincing evidence for the veracity of ASMR: it is not a placebo effect but genuinely triggered in people who experience it. They showed that people who experience ASMR report the ASMR sensation in response to ASMR clips regardless of any expectancy manipulation. When

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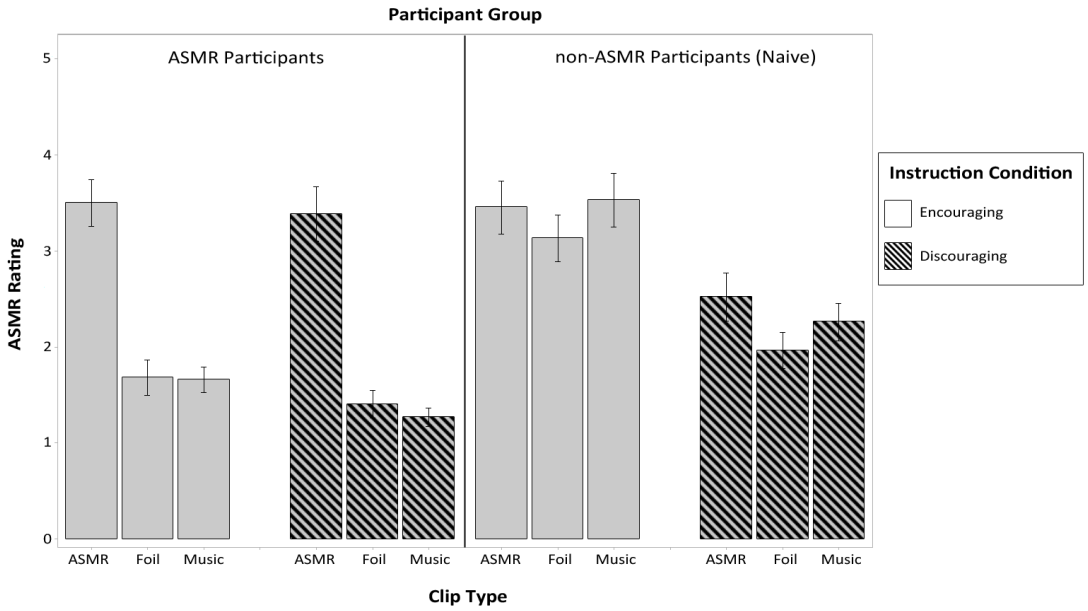

Figure 1. ASMR and non-ASMR participants mean ASMR ratings of all types of clips, for both encouraging and discouraging instructions. Error bars represent Standard Errors of the Mean. This figure was created in *R* from raw data provided by Cash *et al*. Code to reproduce this graph is available on the OSF: https://osf.io/axn3d/

ASMR participants were misdirected to think that ASMR clips prevent ASMR, they still consistently reported the clips as ASMR inducing; and when they were misdirected to think that the control clips were likely to trigger ASMR, they still consistently reported them as less triggering than actual ASMR clips. This evidence is consistent with the view that ASMR is a genuine experience and is inconsistent with the view that it emerges to any ostensibly 'ASMR' stimuli because of expectation.

Our interpretation is also consistent with Cash *et al*.'s findings that ASMR participants rated foil and control music clips lower than non-ASMR participants, regardless of instruction. Cash *et al*.'s interpretation of these results (i.e. that they represent evidence that ASMR participants are deliberately rating these clips as less ASMR inducing due to expectation) is logically problematic. Low ASMR ratings of non-ASMR clips cannot explain whether high ASMR ratings of ASMR clips are caused by expectation or not. Even if they could, the most parsimonious explanation is that the foil and music clips did not physically cause ASMR in the ASMR participants, and thus were accurately rated as low. In contrast, naïve non-ASMR participants are not able to experience ASMR and so their "ASMR-ratings" were not accurate representations of how ASMR-inducing the media was. For this reason, ratings by naïve participants may not be considered as valid reports of ASMR.

Indeed, Cash *et al*. acknowledge that non-ASMR participants may have actually been experiencing frisson, or music chills, when rating the music clip as inducing ASMR – and without further questioning of participants we are unable to tell whether the tingles were ASMR or something else (del Campo & Kehle, 2016; Maruskin et al., 2012). Cash *et al*. acknowledge that the phenomenological difference between frisson and ASMR was reported to them by the ASMR participants and the difference is promoted within the ASMR reddit community from which they sampled (https://www.reddit.com/r/asmr/wiki/index).

Overall, Cash *et al*.'s results provide important evidence for the veracity of ASMR in those that claim to experience it and demonstrate that expectation is unlikely to be the cause of reported ASMR tingling in experiencers. Their findings are consistent with a small but growing body of ASMR research demonstrating that there are self-reported physiological and neurological differences between ASMR experiencers and non-experiencers. Our own studies have compared the emotional and physiological responses of ASMR and non-ASMR participants in response to both ASMR and non-ASMR video clips (Poerio et al., 2018). Similar to Cash *et al*., we found that only ASMR participants reported tingling sensations in response to ASMR videos (but not control videos). We also identified consistently different

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physiological and emotional responses between ASMR and non-ASMR participants in response to ASMR videos (e.g. greater increases in calmness/relaxation and greater reductions in heart rate). Smith et al. (2017) have demonstrated differences between ASMR and non-ASMR participants in terms of their resting state brain activity. Specifically, ASMR participants, compared to non-ASMR participants, showed reduced functional connectivity between frontal, sensory and attentional regions of Default Mode Network. Smith et al. (2017) suggest that these differences may reflect the inability of ASMR participants to inhibit sensory-emotional experiences (such those induced by ASMR triggers).

MOVING FORWARD: RECOMMENDATIONS FOR ASMR RESEARCH

We believe that Cash *et al*.'s interpretations may stem partly from a lack of clarity concerning the characterisation and measurement of ASMR which is both (1) a state (the emotional experience of ASMR in real time – i.e. *feeling* ASMR) and (2) a trait (whether an individual reliably experiences ASMR or not – i.e. *having* ASMR).

Being able to accurately measure the ASMR state and discriminate between those who have the ASMR trait are two key methodological issues for future ASMR research, and essential for robustly examining whether ASMR is a result of participant demand or expectation. Here we provide a set of recommendations to improve efforts in the field for laboratory measurement (state ASMR) and participant recruitment (trait ASMR).

The ASMR state: Measuring the presence/absence and degree of ASMR

Future ASMR research is likely to require the accurate measurement of the ASMR state, and the degree to which it is experienced (for example, this would allow the examination of individual differences within an ASMR sample – such as a comparison of those with more intense vs. mild ASMR experiences). Although we have demonstrated that the ASMR state is associated with physiological changes (Poerio et al., 2018), the routine use of physiological measures to determine/corroborate whether a person is experiencing the ASMR state is likely to be practically prohibitive (e.g. in online studies). We suggest that when attempting to assess the ASMR state via Likert-scale measures after viewing ASMR content, multiple measures should be used, in order to: (1) accurately establish that the sensations felt are characteristic of ASMR and (2) to rule out the possibility that experienced sensations reflect another type of chill sensation. We have detailed these in Table 1 at the end of the document.

We also recommend assessing how the ASMR state is experienced under research conditions compared to participants' everyday lives. Our previous research shows that the ASMR state is experienced less intensely in the laboratory compared to in everyday life (e.g. when watching ASMR content at home) (Poerio et al., 2018). The question we used to measure this was: "Compared to how you usually experience ASMR (e.g. watching videos at home or in daily life) how was your experience of ASMR during this study?" (1 = much less intense, 2 = less intense, 3 = about the same, 4 = more intense, 5 = much more intense).

The ASMR trait: Establishing ASMR status for participant selection

Future ASMR research will inevitably rely on recruiting participants with ASMR and some studies will also seek to compare ASMR experiencers with non-experiencers. Identifying and confirming the presence/absence of ASMR in participants (i.e. trait ASMR) prior to investigation is therefore vital. Participants are likely to self-select as either an ASMR or non-ASMR participant and we recommend that trait ASMR should be independently verified using a standardised protocol which we describe below. We suggest steps 1-3 as a minimum for the recruitment of ASMR/control participants.

1. Description of ASMR. Participants should be provided with a detailed description of ASMR (including emotional correlates, common triggers) and information on the distinction between ASMR and other sensations (e.g. music induced chills). They should be asked, based on the description, whether they experience ASMR or not (yes, no, not sure).

2. ASMR checklist. Participants should complete a checklist/questionnaire that records other features characteristic of the ASMR trait (from previous research)– for example: age of first ASMR experience, a personal triggers checklist (including foil triggers), emotional responses, a written description of the experience and location and direction of tingles on the body. For an example checklist see Fredborg et al. (2017).

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3. ASMR videos. Participants should watch several ASMR videos to confirm ASMR vs. non-ASMR status as per Smith et al. (2017) and Fredborg et al. (2017). This is likely to be particularly important for recruiting non-ASMR participants: in these studies, non-ASMR participants who reported any tingles in response to an ASMR video were excluded as control participants.

4. Consistency tests. Although they are labour-intensive, consistency tests for ASMR participants would help to establish trait ASMR (i.e. whether ASMR is consistently experienced to the same triggers over time). Research on the related sensory phenomenon of synaesthesia has successfully employed such tests. Participants describe their synesthetic experience in response to different stimuli on different occasions (e.g. separated by a week). Synaesthesia status is determined by the consistency of the reports such that synesthetes report more consistent responses to stimuli, even compared to controls instructed to fake a synesthetic response (Eagleman et al., 2007). A similar consistency test could present ASMR/control participants with different ASMR and non-ASMR inducing stimuli on multiple occasions to examine consistency in responses over time. Eagleman *et al*. (2007) have developed a website (http://www.synesthete.org) hosting a battery of consistency tests as a resource for researchers to determine synaesthesia status in potential participants prior to experimental work. A similar standardised resource for ASMR research would be an immensely valuable contribution to the field.

CONCLUSION

We welcome Cash *et al*.'s study which we have argued provides evidence for the veracity of ASMR and contributes to the exciting emerging field of ASMR research. We hope to have made some useful methodological recommendations for those conducting or considering conducting research in the field at this early stage. A consensus on the criteria for establishing and measuring the ASMR trait and state are important prerequisites for progressing the field and allowing the comparison of research studies in the future. Indeed, consistency of measurement is an important issue in psychological research, and fields in which there are multiple commonly-used measures have often suffered from biased and inconsistent results which hampers progress (e.g. depression research Fried, 2017)

We hope that our recommendations represent a strong foundation for researchers in the field to work together to establish a defined and accepted protocol for measuring ASMR so that we can better understand the fascinating phenomenon of ASMR.

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Table 1. Criteria to use when measuring state ASMR using questionnaire measures.

ASMR measure	Explanation	Example items
Frequency and time course of tingling sensations	ASMR tingling sensations are likely to be of longer duration and more "dynamic" in comparison to music induced chills (Fredborg et al., 2017; del Campo & Kehle, 2016).	*"How frequently (if at all) did you experience tingling sensations during the video?"* 1(none of the time) to 7(all of the time). *"When you experienced tingling sensations, how long did they last for?"* (Open ended response) *"Which option best describes how the tingling sensations felt to you?"* They were sustained throughout the whole clip/They were constant but came in waves as the intensity ebbed and flowed/They were fleeting sensations that came and went/ Other (please describe).
Intensity of tingling sensations	To determine intensity of ASMR response (which may be useful for individual difference examinations).	"How intense were the tingling sensations?"1(very mild) to 7 (very intense)
Location of tingling sensations	Barratt & Davis (2015) have shown that ASMR tingles generally start at the top of the head and move down the back and shoulders, thus differentiating them from other kinds of chill sensations such as frisson that may start on the arms or shoulders (Craig, 2005).	Present a diagram of the human body where participants can indicate areas in which they experienced tingles and their direction of travel, and/or free text response box.
Emotional responses	Poerio et al. (2018) have shown that ASMR tingles are consistently accompanied by increased high and low arousal pleasant affect (e.g. feelings of excitement and calmness) which differentiates them from music-induced chills which are typically associated more with high activation pleasant affect and strong emotions of being moved or touched (Bannister, 2018; del Campo & Kehle, 2016; Grewe et al., 2009).	*"Please indicate how you feel now compared to before you watched the video, from 1(much less) to 7(much more)"* for various items measuring high and low arousal positive and negative affect (i.e. excitement, sadness, calmness, and stress). Alternatively, these can be calculated from pre- and post- measures. Items should be taken from validated affect measures indexing the four poles of the circumplex model of affect (Remington et al., 2000).

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