The effects of Autonomous Sensory Meridian Response (ASMR) videos on arousal and mood in adults with and without depression and insomnia

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Abstract

Background: Autonomous Sensory Meridian Response (ASMR) is a pleasant physiological tingling sensation induced by certain visual and auditory triggers. ASMR has been shown to reduce stress and increase positive mood, but its effects have not yet been studied in populations with clinically severe symptoms. The present study aimed to investigate whether the experience of ASMR improved mood and reduced arousal in people with and without insomnia and depression symptoms.
Methods: 1,037 participants (18-66 years) completed online questionnaires assessing insomnia and depression symptom severity followed by questionnaires on current mood and arousal levels before and after watching an ASMR video. The independent variables were the participant's group (insomnia, depression, insomnia and depression combined or control) and whether they experienced ASMR during the video. The dependent variables were the change in mood and arousal levels after watching the video.
Results: As predicted, all participants showed significantly increased relaxation and improved mood after watching the video with the largest effects for participants who experienced ASMR and for participants in the combined and depression groups. No difference was found between the insomnia and control groups.
Limitations: It is not known how many participants were familiar with ASMR videos prior to taking part in the study (nor whether this is important). Also, the categorization of participants into the ASMR group was based on self-report and thus, not verified.
Conclusions: Results suggest that ASMR videos have the potential to be used to improve mood and reduce arousal with implications for alleviating symptoms of insomnia and depression.

Key words: Insomnia – Depression – Autonomous Sensory Meridian Response (ASMR) – Mood – Arousal

Introduction

Autonomous Sensory Meridian Response (ASMR) is a physiological phenomenon that describes a tingling sensation usually starting in the scalp and moving down the body induced by certain visual and auditory triggers (Barratt et al., 2017). Videos designed to elicit ASMR are a popular subgenre of videos on YouTube. The content of ASMR videos ranges from purely auditory stimuli designed to elicit ASMR such as tapping, whispering and speaking softly to role plays where the video creator (also known as an ASMRtist) guides the viewer through an activity generally found to be relaxing in real life such a haircut or eye test.

Recent evidence has shown that the experience of ASMR is associated with specific activation in areas of the brain associated with reward and emotional arousal (Lochte et al., 2018). Furthermore an EEG investigation found that the experience of ASMR increases alpha wave activity in frontal regions of the brain, suggesting a physiological relaxation response to the experience of ASMR. (Fredborg et al., 2021). Interestingly, the same study reported that participants who watched the same stimuli but did not experience ASMR actually demonstrated decreased alpha activity in the same areas. This suggests that stimuli designed to elicit ASMR and relax people can also have the reverse effect on those who do not experience ASMR.

While research has explored the mechanism of ASMR, little is known about the effects of experiencing ASMR. Poerio and colleagues conducted a pair of studies looking into the psychological and physiological effects of experiencing ASMR (Poerio et al., 2018). In the first study, participants were asked to complete a mood questionnaire after watching ASMR videos and the second study monitored the heart rate of participants during and after watching ASMR videos. They found that participants who experienced ASMR became significantly more calm, less stressed and less sad than the non-ASMR group. A greater reduction in heart rate was also seen for those experiencing ASMR.

ASMR viewers usually watch the videos before going to sleep as a way to facilitate sleep onset as a result of improvement in mood and increased relaxation when watching the videos (Barratt et al., 2017). Therefore, ASMR could potentially have therapeutic effects for insomnia populations, given the potential to modulate high arousal levels associated with insomnia.

Increased arousal in people with insomnia has been documented at the cortical (Nofzinger et al., 2004; Winkelman et al., 2008) cognitive (Harvey, 2002) and behavioral (Spielman et al., 1987) levels and such conceptualizations of insomnia are reflected in the recommended management approaches (Riemann et al., 2017), which include the use of treatments designed to reduce arousal (and increase relaxation).

Although insomnia can occur in isolation of any other mental health problems, insomnia is frequently comorbid with a range of other mental disorders such as bi-polar disorder and depression (Baglioni et al., 2011; Riemann and Voderholzer, 2003; Talbot et al., 2012). The link between insomnia and depression is so well established in the literature that management plans for depression often include treatment components to tackle insomnia with some studies suggesting that intervention is more successful when both problems are addressed (Manber et al., 2008) and that insomnia improvement may mediate the improvement in depressive symptoms (Cunningham and Shapiro, 2018).

Given the increases in relaxation and positive mood which have been reported to be associated with ASMR (e.g. Barratt et al, 2017; Poerio et al., 2018), it is possible that ASMR could have a particularly beneficial effect on individuals experiencing insomnia and/or depression. However, it is perhaps important to be aware that, irrespective of the effects of ASMR, it is possible that participants' conscious, emotional, reactions to watching the videos could also conceivably be associated with changes in their mood and arousal (both positive and negative). A number of common ASMR triggers such as lip smacking and nail tapping were also listed as some of the most common sounds to elicit misophonia in a recent study (Jager et al., 2020). It is therefore important to try and investigate the effects of ASMR whilst controlling for people's conscious reaction to the video content.

The present study aimed to a) investigate whether the experience of ASMR improves mood and reduces arousal in adults with and without symptoms of insomnia and/or depression (whilst controlling for the participants feelings about the video) and b) describe aspects of the subjective experience of ASMR to further understand of the nature of this experience.

It was predicted that participants with insomnia and/or depression symptoms (i.e. deficits in these areas which are supposedly affected by ASMR videos) would be more greatly affected than a control group, with the largest effects being shown by those with both insomnia and depression symptoms. It was anticipated that these effects would be influenced by experiencing ASMR so that participants who experienced ASMR whilst watching the video would show a larger improvement in mood and relaxation than participants who watched the video without experiencing ASMR.

Methods

Participants

Participants were recruited using an online invitation posted in an Oxford Brookes Psychology Students' Facebook group and advertised in the YouTube description of the ASMR video which was used in the current study. A total number of 2,252 participants responded to the questionnaire; after excluding participants who had had not been able to access the video (n=16) or had significant amounts of missing data (n=1,199), a final 1,037 were used in data analysis. Participants included 267 males, 756 females and 14 'prefer not to say'. The 802 who provided their age were aged between 18 and 66 (M=28.2, SD=9.6).

Materials

An online questionnaire was used, comprised of four scales measuring insomnia, depression, mood and arousal. As well as these scales, a number of questions relating to an ASMR video were included along with demographic questions.

The Insomnia Severity Index (ISI) (Bastien et al., 2001) consists of 7 questions examining insomnia symptoms over the last 2 weeks, using a 5 point Likert scale to indicate severity. The validated cut-off score to indicate clinical severity of symptoms was used to group participants into those with and without insomnia. A score of 15-21 indicates moderate severity of clinical insomnia and 22-28 indicates severe clinical insomnia. Participants scoring 15 or over were considered to fulfil the criteria for having insomnia in the current study.

The ISI was altered slightly in the wording of the questions so that, where appropriate, items asked about participants' sleeping "pattern" not "problem", as it was anticipated that not all participants would have a sleep problem (e.g. 'How worried/distressed are you about your current sleep problem?' became 'How worried/distressed are you about your current sleep pattern?').

The Patient Health Questionnaire (PHQ-9) (Kroenke et al., 2001) consists of 9 statements investigating symptoms of depression over the last 2 weeks using a 4-point Likert scale to indicate frequency of experience. A score 10-14 indicates moderate depression, 15-19 is moderately severe and 20-27 is severe depression. Participants scoring 10 or over were considered to meet the criteria for depression in the current study.

The Short Depression-Happiness Scale (SDHS) - modified (Joseph et al., 2004) consists of 6 statements (3 positive, 3 negative) designed to measure self-reported depression and happiness on a continuum. Items were re-phrased to ask about the participants' current feelings, rather than over the last week so, for example, "I felt happy" became "I feel happy" and "I felt that life was meaningless" became "I feel that life is meaningless". Respondents indicated the intensity with which they were currently experiencing each feeling on a 4-point Likert scale (of 'not at all', 'not very much', 'somewhat', 'very much'). Total scores ranged between 0 and 18, with higher scores indicating more positive, current feelings on the depression-happiness spectrum. In the current study, scores on this scale were labelled as 'mood'.

The Pre-Sleep Arousal Scale - modified (PSAS) (Nicassio et al., 1985) consists of 16 items describing symptoms of cognitive and somatic arousal when trying to get to

sleep. However, in the current study participants answered the questions in relation their current feelings of arousal (instead of prior to sleep). The wording of some questions was altered to not be sleep specific, for example “Worry about problems other than sleep” was changed to “Worry about problems”. Response options were also modified, and participants rated their current arousal by indicating how much they were currently experiencing each symptom on a 4-point Likert scale (of ‘not at all’, ‘not very much’, ‘somewhat’, ‘very much’), rather than 5 point, to be comparable with the SDHS response options. Total scores ranged between 0 and 48, with higher scores indicating more current arousal. In the current study, scores on this scale were labelled as ‘arousal’.

Cronbach’s Alpha tests showed that the four scales used in the questionnaire were internally consistent: ISI (α = .84), PHQ-9 (α = .86), SDHS pre-video (α = .88), SDHS post video (α = .87), PSAS pre-video (α = .88) and PSAS post-video (α = .87).

The ASMR video - An ASMR video (approximately 2 minutes long) taken from YouTube was used as the ASMR stimulus. The video includes an assortment of popular auditory triggers shot in a ‘point-of-view’ style and presented by a popular ASMRtist, creator of the YouTube channel “GentleWhispering”. This video was selected given its short duration, reducing the likelihood of participant drop out, and also because it was created to give viewers a ‘taster’ of what ASMR is and so it was appropriate to use with participants who had never seen an ASMR video before.

A pilot study with 9 participants, conducted in the lab, was used to investigate if a 2-minute video would be long enough to elicit changes in participants’ report of their mood and arousal, which it was found to be, and so the video was not replaced by a longer one.

ASMR experience – Participants were asked “Did you feel any sensations whilst watching the video such as tingles? If yes, please describe the sensation(s) and where on your body you felt them.” and given an open text box in which to write their response. These responses were used to categorize them into one of three groups: those who experienced ASMR (‘Experienced ASMR’ group), those who did not

experience ASMR (‘No ASMR’ group) and those whose experience was unclear (‘Ambiguous ASMR’ group).

The ‘Experienced ASMR’ group consisted of participants whose descriptive responses included wording describing a sensation commonly associated with ASMR (i.e. tingling or chills or tickling or fuzzy or prickly) AND in a body location commonly described in association with ASMR (i.e. head, scalp spine, neck, shoulders, ears, face or back). Participants who did not report any of the above ASMR sensations, nor any such sensation in any of the above locations, were classified into the ‘No ASMR’ group. Participants who reported an ASMR sensation but in a non-ASMR location (e.g. buttocks, feet) or those reporting a non-ASMR sensation (e.g. warmth, relaxation) in an ASMR location were considered to be in an ‘Ambiguous ASMR’ group.

Another open response box was given for any other comments participants wanted to make about the video. Participants were also asked to rate their enjoyment of the video on a scale of 1-10 (1 = did not enjoy it 10 = enjoyed it very much), their positivity towards the ASMRtist, also on a scale of 1-10 (1 = not positive, 10 = very positive) and to confirm that they were able to wear headphones and be alone whilst watching the video as requested in the participant information sheet.

Demographic factors -The questionnaire was anonymous but participants were asked to report their age in years and sex (male, female or prefer not to say).

Design

Two factorial 4x2 between groups designs were used to investigate the effects of mental health symptom group and experience of ASMR, on changes in a) arousal and b) mood after watching the video, whilst controlling for the participants’ conscious response to the video content. The first independent variable was the mental health symptom group the participant belonged to: Insomnia (ISI score ≥15 and PHQ-9 score ≤9), Depression (PHQ-9 score ≥10 and ISI score ≤14), Combined (meeting criteria for both insomnia and depression i.e. ISI score ≥15 and PHQ-9 score ≥10) and Control (not meeting criteria for either insomnia nor depression i.e. ISI score ≤14 and PHQ-9 score ≤9) as categorized by their responses to the ISI and

PHQ-9 as described in ‘Materials’. The second independent variable was whether or not the participant experienced ASMR from the shown video (only the ‘Experienced ASMR’ and ‘No ASMR’ groups were included; the Ambiguous group was excluded from these analyses in view of the fact that the group likely included participants who both had and had not experienced ASMR). The dependent variables were the changes in arousal (PSAS) and mood (SDHS) after watching the video. The covariate was the reported positivity towards the ASMRtist.

Procedure

The study was approved by the Oxford Brookes Psychology Department Ethics Committee.

The participant information, consent form, questionnaires and video were presented via the online platform Qualtrics. After reading the online participant information sheet participants ticked boxes to confirm that they were over the age of 18 and consented to take part. Consenting participants then completed the ISI and PHQ-9 and were asked about their current arousal levels (PSAS) and mood (SDHS). On completion they were shown a short ASMR video. Once the video had finished participants immediately answered questions about their experience of the video/ASMR followed by a repeat of the questionnaires on current arousal (PSAS) and mood (SDHS). The order of presentation of these repeated questionnaires was counter balanced to reduce practice and order effects. At the end of the questionnaire participants were directed to a page where they were debriefed and thanked for their participation.

Analysis

Exploration of the data suggested that parametric statistical analyses were appropriate. SPSS (v24) was used for all analyses. Independent samples t-tests were used to investigate differences between the ‘Experienced ASMR’ and ‘No ASMR’ groups for their experience of watching the video in terms of both a) enjoyment and b) positivity. Pearson’s r correlational analysis was used to investigate the relationship between these two elements of watching the video (enjoyment and positivity) to decide upon an appropriate co-variate for subsequent analyses. Two, 4x2 between groups ANCOVAs were run to assess the effect of mental health symptom group (Insomnia, Depression, Combined and Control) and

ASMR experience ('Experienced ASMR' and 'No ASMR') on changes in a) mood (SDHS) and b) arousal (PSAS), pre- and post-video. The difference between pre- and post-video scores on the PSAS was used as the change in arousal score and the difference between pre- and post-video scores on the SDHS was used to indicate the change in mood. Ratings of positivity towards the ASMRtist were used as a covariate to control for the individuals' conscious response to watching the video. It should be noted that for the dependent variable 'mood' there was a violation of the assumption of homogeneity of the regression slopes across the groups: covariate (positivity) x ASMR experience x mental health symptom group ($F(3, 819)=4.230$), $p =0.005$). Post hoc simple main effects tests with Bonferroni corrections were used to explore significant interactions. Two participants (both in the ASMR group) had a missing item score for one of the six items of the SDHS (at the pre-video assessment) and their total scores were pro-rated for use in analysis. Descriptive statistics were used to present information about the location and sensation of any experiences associated with watching the video for both the 'Experienced ASMR' and 'Ambiguous ASMR' groups in the hope of furthering understanding about individuals' responses to ASMR videos and the nature of an ASMR experience.

Results

Of the 1037 participants, 724 met our criteria for having experienced ASMR and 111 met the criteria for NOT experiencing ASMR. For 202 participants their ASMR experience was ambiguous (as defined in the Method section).

The distribution of participants within the four mental health symptom groups, including their age in years (mean (M) and standard deviation (SD)) and gender split (male (m), female (f) and prefer not to say (pns)) for each group are shown in Table 1. Of note to describe the sample, of the participants in the 'Experienced ASMR' and 'No ASMR' groups (i.e. excluding the 'Ambiguous ASMR' group, whose data were not included in analyses exploring changes in mood and arousal) less than 1% of those with insomnia met the criteria for 'severe' insomnia and 4% of those with depression met the criteria for severe depression, according to the ISI and PHQ-9 cut-off scores, respectively; this means that the majority of participants suffering from

insomnia and depression reported having moderate or moderately severe symptoms. In Table 1 participants are also split between those who had, according to our definitions, experienced ASMR whilst watching the video ('Experienced ASMR'), those who had not ('No ASMR') and those who had an ambiguous experience ('Ambiguous ASMR').

INSERT TABLE ONE

Experience of watching ASMR video

An independent samples t-test found that the 'Experienced ASMR' group rated their enjoyment of the video (M=8.68, SD=1.49) significantly higher than the 'No ASMR' group of participants (M=6.77, SD=2.74): $t(119) = -7.15$, $p<.001$). Similarly the 'Experienced ASMR' group rated their positivity towards the ASMRtist (M=9.20, SD=1.29) as significantly higher than participants in the 'No ASMR' group (M=7.81, SD=2.73): $t(118) = -5.27$, $p<.001$. For the two groups combined (N=835) enjoyment of the video and positivity towards the ASMRtist were positively correlated (Pearson's $r = .702$, $p<0.001$).

Difference in change in mood based on mental health symptom group and experience of ASMR, controlling for positivity towards the ASMRtist

The pre- and post- video mood (SDHS) mean scores for each mental health symptom group and ASMR experience group as a whole and also for subgroups when interactions between these variables are considered, are shown in Table 2.

INSERT TABLES TWO AND THREE

A 4x2 between groups ANCOVA was run to assess the effect of mental health symptom group (Insomnia, Depression, Combined and Control) and ASMR experience ('Experienced ASMR' and 'No ASMR') on changes in mood (SDHS), pre- and post-video. Ratings of positivity towards the ASMRtist were used as a covariate to control for the individuals' conscious response to watching the video. Means (SD) and adjusted means (SE) for change in mood (SDHS) after watching the video for each mental health symptom and ASMR experience group are shown in Table 3.

There was a significant interaction between mental health symptom group and experience of ASMR on change in mood, whilst controlling for positivity towards the ASMRtist: $F(3, 826) = 4.55$, $p = .004$, partial $\eta 2 = 0.16$. Whilst main effects of mental health symptom group ($F(3, 826) = 3.27$, $p=.021$, partial $\eta 2 = 0.12$) and ASMR experience ($F(1,826)=10.85$, $p=.001$, partial $\eta 2 = 0.13$) were also statistically significant, post hoc simple main effects tests with Bonferroni corrections indicated that experiencing ASMR, compared to not experiencing ASMR, only led to significantly increased positive mood for the Depression ($p=.044$) and the Combined ($p<.001$) mental health symptom groups and not for the Insomnia and Control groups. There were no significant changes in mood for any of the symptom groups if they did not experience ASMR.

Although both the Depression and the Combined groups reported increased positive mood after experiencing ASMR, the extent of the change differed significantly between these two groups, with the Combined group reporting significantly more positive change than the Depression group ($p=.006$). The Combined group's mood scores after experiencing ASMR were also significantly higher than the Insomnia ($p<.006$) and Control ($p<.001$) groups. For the Depression group they also reported significantly more positive mood after experiencing ASMR compared to the Control group ($p<.001$) however their change in mood scores did not differ significantly from the Insomnia group. No other pairwise comparisons were significant. The plot of the mean difference in mood scores for the various mental health symptom groups who did and did not experience ASMR are shown in Figure 1.

INSERT FIGURE 1

Difference in change in arousal based on mental health symptom group and experience of ASMR, controlling for positivity towards the ASMRtist

The pre- and post- video arousal (PSAS) mean scores for each mental health symptom and ASMR experience group as a whole and also for subgroups when interactions between these variables are considered, are shown in Table 2.

A further 4x2 between groups ANCOVA was run to assess the effect of mental health symptom group (Insomnia, Depression, Combined and Control) and ASMR

experience (‘Experienced ASMR’ and ‘No ASMR’) on changes in arousal (PSAS), pre- and post-video. Ratings of positivity towards the ASMRtist were used as a covariate to control for the individuals’ conscious response to watching the video. Means (SD) and adjusted means (SE) for change in arousal (PSAS) after watching the video for each mental health symptom and ASMR experience group are shown in Table 3.

A significant interaction was found between mental health symptom group and experience of ASMR on change in arousal, when controlling for positivity towards the ASMRtist: $F(3, 826) = 4.94$ $p=.002$, partial $\eta 2 = 0.18$. Whilst main effects of mental health symptom group ($F(3, 826) = 5.88$, $p=.001$, partial $\eta 2 = 0.21$) and ASMR experience ($F(1,826)=9.02$, $p=.003$, partial $\eta 2 = 0.11$) were also statistically significant, post hoc simple main effects tests with Bonferroni corrections indicated that experiencing ASMR, compared to not experiencing ASMR only led to significantly decreased arousal for the Depression ($p<.001$) and the Combined ($p<.001$) mental health symptom groups and not for the Insomnia and Control groups. There were no significant changes in arousal for any of the symptom groups if they did not experience ASMR.

Reports of increased arousal after experiencing ASMR did not differ significantly between the Depression and the Combined groups but scores for both groups differed from the two other groups in the same pattern: The Depression group’s arousal scores after experiencing ASMR were significantly higher than the Insomnia ($p=.012$) and Control ($p<.001$) groups; the Combined group’s arousal scores after experiencing ASMR were also significantly higher than the Insomnia ($p<.001$) and Control ($p<.001$) groups. No other pairwise comparisons were significant. The plot of the mean difference in arousal scores for the various mental health symptom groups who did and did not experience ASMR are shown in Figure 2.

INSERT FIGURE 2

Participant experience of ASMR

By definition, all 724 participants in the ASMR group reported experiencing ASMR. Of the Ambiguous ASMR group (n=202), 188 (93%) also reported experiencing

ASMR although the reported location and/or sensation precluded their experience as being categorized as ASMR for our analysis, according to the definition used in the current study. To further understand the experience of participants, both in the 'Experienced ASMR' and the 'Ambiguous ASMR' groups, the location of where in the body ASMR was reported as felt is presented in Table 4; many participants felt ASMR in more than one location but the head and scalp were the most commonly mentioned areas by both of these ASMR experience groups.

INSERT TABLE FOUR

Participants were also asked to describe the sensations they experienced whilst watching the video. Table 4 also shows the most commonly used adjectives used to describe the sensation of ASMR (of course, some participants used multiple descriptors). It is notable that for the 'Ambiguous ASMR' group sensations other than tingles (i.e. relaxation and a pleasant feeling) were more prominent.

Although Table 4 provides an overview of the physical sensations which were elicited by the video, given the limited understanding of the experience of ASMR and the dearth of studies reporting about this phenomena two examples of more extensive, but typical, descriptions of ASMR from the 'Experienced ASMR' group are given below, providing an insight into the varying experiences of ASMR whilst also showing similarity in a kind of tingling sensation often felt in the head and other parts of the body:

"A very pleasurable (but not sexual) physical tingling feeling across my scalp, my face, and (what felt like) inside my brain... Also emotional pleasure - peacefulness, feeling mesmerised, feeling like I want to sit very, very still. What I imagine a cat feels like being stroked."
"... sparkling feeling at the back of the head, back, buttocks, legs...moved around at different parts of the video"

Examples of descriptions of the sensations experienced by the Ambiguous ASMR group, whilst not referring to sensations which might typically be considered as

ASMR, do suggest that the participants had some reaction to watching the ASMR video; typical examples are shown below:

“I do not feel a tingling sensation, but I do feel relaxed, my breathing slows, I forget my body and find myself on the edge of sleep.”
“General sense of well-being, almost like a physical pleasure or harmony in the body, throughout entire body.”

Discussion

This was the first study to investigate the experience of ASMR in relation to mental health symptoms. The first aim of the study was to investigate whether the experience of ASMR improves mood and reduces arousal in adults with and without symptoms of insomnia and/or depression. Whilst main effects for experience of ASMR were found, (suggesting that all participants who experienced ASMR had a significant increase in mood and decrease in arousal), this effect was modulated by the symptom group. Participants in the Combined group who experienced ASMR showed a significant increase of positive mood compared to all other groups and a significant decrease in arousal when compared to the Insomnia and Control groups. Similarly, the Depression group had a significant increase in mood and decrease in arousal when compared to the Insomnia and Control groups.

These results align to the findings of Poerio and colleagues (Poerio et al., 2018), in that the experience of ASMR is related to increased positive mood and relaxation. Interestingly, there were no differences between the Insomnia and Control groups, suggesting that the experience of ASMR could have a larger effect on the mechanisms involved in depression than insomnia.

One potential explanation for the positive effects of ASMR could be in its relation to social grooming. Previous research into social grooming in primates and humans has found that the pleasure responses elicited by grooming are due to the release of oxytocin and endorphins which can stimulate calmness and peacefulness in the individual being groomed (Dunbar, 2010). Many ASMR videos simulate haircuts and massages and it is possible that these social grooming experiences could induce a

similar social-bonding response in the viewer thereby accounting for the relaxing and mood raising effects.

There has been little research on social interaction through online videos and so it is not certain whether the same effects can be felt when one is not actually in a close physical proximity to the other person. However, a study by Seltzer, Ziegler & Pollak (Seltzer et al., 2010) found that after applying a social stressor, children's cortisol levels were reduced most quickly by physical and verbal comfort from the mother, however the children showed similarly reduced cortisol simply by listening to their mother's voice when she wasn't physically present. This suggests that social vocalizations can trigger the release of oxytocin to a similar degree that physical touch can, meaning that an online video could work in a similar way as only the vocalizations are needed to induce relaxation.

The second aim of this study was to investigate the reported experience of ASMR. As ASMR is a relatively new field of research, optimal definition and measurement of the sensation is not yet established. Whilst previous EEG and MRI work has shown physiological changes occurring when individuals report feeling ASMR (Fredborg et al., 2021; Lochte et al., 2018), the description of what is 'felt' is largely based on anecdote and limited, subjective descriptions in the literature (e.g. Barrat et al, 2017). Therefore, this study aimed to contribute to understanding of the ASMR response by identify commonalities (and differences) in the reporting of the experience of ASMR.

In line with Barrat et al's (2017) findings, a large majority of the participants who experienced ASMR in the current study largely reported feeling the sensation in their head/scalp (82%), with a third of participants also identifying the sensation in the back/spine and/or the neck. The description of the sensation itself also followed previous reporting, with the word "tingles/tingling" being used by many. However, many participants also reported a calmness or sleepiness associated with the sensation. Typically, a general feeling of relaxation or calmness would not in itself be considered as an ASMR sensation, given that those sensations can arise in other situations outside of experiencing ASMR, however, as an accompaniment to the commonly reported "tingling" sensation this would be quite a typical description of

ASMR. This highlights the difficulty of identifying a ‘real’ ASMR response, without any objective, accepted criteria.

In the present study, as outlined in the methods, participants whose description of ASMR was more ambiguous/atypical were not included in analysis. However, 93% of the participants in this Ambiguous group answered “yes” to the question of whether they had experienced ASMR while watching the video. How best to define ASMR remains an important topic for future research. Although there now exists a checklist which attempts to systematically assess the intensity and speed of onset of ASMR-related tingles in relation to individual triggers (Fredborg et al, 2017). Whether this sufficiently captures the breadth of ASMR experience remains unknown. Future efforts to clarify the definition and studies to investigate the links between subjective and objective responses to ASMR stimuli would facilitate future research in this area.

There are a number of limitations with the present study. Firstly, changes to mood and relaxation were only subjectively reported, using standardised measures which were adapted for current use. The psychometric properties of the scales used (including the validity of the outcome scores, test-retest reliability, measurement invariance -both across groups and longitudinally- and minimal clinically important differences) cannot be assumed to be the same as for the original scales. The accuracy of measurement of these constructs would be increased in future studies with the inclusion of biological measures alongside subjective reporting.

Secondly, as mentioned above, as there is currently no standardized way of measuring whether or not someone has experienced ASMR there may be some inaccuracies within the categorization of the ASMR and non-ASMR group. To mediate this limitation the researchers removed data from participants giving ambiguous descriptions of the sensation. However, there is no current objective measure for whether participants were placed into the correct groups.

Third, many of the participants were recruited via an advertisement on the Facebook page of the popular ASMRtist “GentleWhispering”, which could result in a positive bias within the sample selection. This could lead to a higher likelihood of participants reporting positive effects after viewing the ASMR video. However, to address this

concern, researchers controlled for positivity toward the ASMRtist within the analysis.

Relatedly, it should be acknowledged, that the results of the current study may be specific to the single ASMR video which was used in the study. Whether the same results would be achieved with other videos, of different content and form, is not known. It would also be helpful for future studies to explore different video conditions (e.g. watching a non-ASMR video, watching no video) to help clarify further whether any effects are specific to the experience of ASMR and also whether, even without the perceived experience of ASMR, watching ASMR videos has any benefits for the viewer.

Caution should be applied to the interpretation of the ANCOVA results (especially given the violation of the assumption of the homogeneity of the regression slopes across the groups for the reported changes in mood which suggests that the covariate – positivity towards the ASMRtist – varied as a function of both the mental health grouping and the experience of ASMR) and they should be treated as preliminary and exploratory as the categorical independent variables were observed rather than manipulated. The small numbers in some cells and unbalanced numbers across cells also mean that the results are less robust than they might otherwise be and that our suggestion that the experience of ASMR may have varying benefits depending on the constellations of mental health symptoms will need verification in future experimental work.

Finally, a very small proportion of the insomnia and depression group fell within the “severe” category for either disorder. Therefore, the present findings may not translate to clinical samples with severe symptoms. Future studies should look specifically within clinical populations in order to assess replication with a clinical sample.

Given the positive changes in mood and arousal seen in the Combined and Depression group after experiencing ASMR, future research should investigate the use of ASMR as a mood and arousal modulator, including possibly as an adjunct to

therapy for people who experience depression with or without insomnia. Given the ease of access to ASMR videos, this could be a potential avenue for affordable and scalable treatment.

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Table 1. *Distribution of participants within the four mental health symptom groups and those who did and did not experience ASMR: mean decimalised ages and gender split.*

ASMR Experience	**Mental Health Symptom Group**	**Age (M, (SD))**	**Gender***
Experienced ASMR n=724	**Insomnia N=40**	31.08 (10.99)	m = 12, f = 26, pns=2
	Depression N=150	25.32 (7.30)	m=24, f=125, pns=1
	Combined N=82	27.12 (7.86)	m=18, f=63, pns=1
	Control N=452	28.59 (9.01)	m=122, f=324, pns=4
No ASMR N=111	**Insomnia N=2**	25.50 (6.36)	m=0, f=2, pns=0
	Depression N=23	26.56 (10.88)	m=5, f=18, pns=0
	Combined N=9	32.38 (15.45)	m=3, f=6, pns=0
	Control N=77	29.47 (11.65)	m=22, f=55, pns=0
Ambiguous ASMR N=202	**Insomnia N= 13**	33.33 (6.11)	m=4, f=9, pns=0
	Depression N=49	27.11 (11.44)	m=14, f=33, pns=2
	Combined N=37	29.17 (9.55)	m=12, f=25, pns=0
	Control N=103	29.70 (12.12)	m=31, f=70, pns=2

* m=male, f=female, pns = prefer not to say

Table 2: *Means (and standard deviations) of mood (SDHS) and arousal (PSAS) scores before and after watching the video for each mental health symptom and ASMR experience group*

ASMR experience	**Mental Health Symptom group**	**Mood pre**	**Mood Post**	**Arousal pre**	**Arousal post**
Experienced ASMR N=724		11.91 (4.12)	13.67 (3.63)	13.25 (8.67)	5.90 (5.71)
No ASMR N=111		11.72 (4.08)	12.59 (4.01)	11.29 (8.61)	6.83 (8.47)
All participants (Experienced ASMR and No ASMR groups combined) N=835	**Insomnia N=42**	12.45 (2.75)	14.36 (2.72)	12.40 (8.32)	5.40 (4.79)
	Depression N=173	8.80 (3.37)	10.98 (3.71)	18.50 (8.21)	9.11 (6.19)
	Combined N=91	7.65 (3.86)	10.69 (4.16)	22.92 (8.96)	11.82 (9.87)
	Control N= 529	13.58 (3.24)	14.78 (2.90)	9.53 (6.26)	4.06 (3.99)
Experienced ASMR N=724	**Insomnia N=40**	12.33 (2.64)	14.32 (2.70)	12.47 (8.51)	5.40 (4.91)
	Depression N=150	8.82 (3.39)	11.14 (3.66)	19.09 (8.11)	9.01 (5.88)
	Combined N=82	7.65 (3.80)	11.00 (3.92)	22.40 (8.75)	10.55 (8.24)
	Control N=452	13.671 (3.24)	14.94 (2.87)	9.73 (6.31)	4.06 (3.99)
No ASMR =111	**Insomnia N=2**	15.00 (4.24)	15.00 (4.24)	11.00 (2.83)	5.50 (0.71)
	Depression N=23	8.70 (4.02)	9.91 (3.98)	14.61 (7.99)	9.78 (8.10)
	Combined N=9	7.67 (4.66)	7.89 (5.40)	27.67 (10.04)	23.44 (15.45)
	Control N=77	13.01 (3.19)	13.87 (2.96)	8.39 (5.87)	4.04 (4.05)

Table 3: *Means (SD) and adjusted means (SE) for change in mood (SDHS) and arousal (PSAS) after watching the video for each mental health symptom and ASMR experience groups*

ASMR experience	**Group**	**Mood change Mean (sd)**	**Mood change Adj Mean (SE)**	**Arousal change Mean (sd)**	**Arousal change Adj Mean (SE)**
Experienced ASMR n=724	**Insomnia N=40**	-2.00 (2.01)	-1.97 (0.33)	7.08 (7.21)	7.02 (0.89)
	Depression N=150	-2.32 (2.16)	-2.34 (0.17)	10.09 (6.40)	10.12 (0.46)
	Combined N=82	-3.35 (3.29)	-3.29 (0.23)	11.85 (6.87)	11.74 (0.62)
	Control N=452	-1.27 (1.71)	-1.22 (0.98)	5.66 (4.99)	5.58 (0.27)
No ASMR N=111	**Insomnia N=2**	0.00 (0.00)	-0.002 (1.46)	5.50 (3.54)	5.50 (3.97)
	Depression N=23	-1.22 (1.62)	-1.40 (0.43)	4.83 (4.96)	5.14 (1.18)
	Combined N=9	-0.22 (5.70)	-0.52 (0.69)	4.22 (8.21)	4.73 (1.88)
	Control N=77	-0.86 (1.78)	-1.09 (0.24)	4.35 (5.04)	4.76 (0.66)

Table 4. *Location of ASMR sensation on body and sensation reported for the Experienced ASMR and Ambiguous ASMR groups; number of participants and % of the group.*

	Experienced ASMR N=724	**Ambiguous ASMR N=202**
Bodily location where sensation experienced		
Head/Scalp	594 (82%)	60 (29.7%)
Spine/Back	249 (34.4%)	30 (14.9%)
Neck	236 (32.6%)	24 (11.9%)
Arms	153 (21.1%)	17 (8.4%)
Shoulders	137 (19%)	14 (6.9%)
Legs	107 (14.8%)	14 (6.9%)
Ears	60 (8.3%)	5 (2.5%)
Face	44 (6.1%)	2 (1.0%)
Chest	54 (7.5%)	9 (4.5%)
Hands	13 (1.8%)	6 (3.0%)
Feet	13 (1.8%)	7 (3.5%)
Stomach	23 (3.2%)	5 (2.5%)
Hips	16 (2.2%)	2 (1.0%)
Buttocks	10 (1'4%)	1 (0.5%)
Genital (non-sexual)	2 (0.3%)	1 (0.5%)
Description of sensation		
Tingles	669 (92.4%)	30 (14.9%)
Relaxation/Calmness/Sleepiness	141 (19.5%)	51 (25.2%)
Coldness/Chills/Goosebumps	60 (8.3%)	8 (4.0%)
Pleasant	82 (11.3%)	32 (15.8%)
Warmth	33 (4.6%)	7 (3.5%)
Tickling	27 (3.7%)	2 (1.0%)
Fuzzy/Buzzing/Bubbly	21 (2.9%)	2 (1%)
Prickly	11 (1.5%)	2 (1%)
Numbness	6 (0.8%)	3 (1.5%)

Figure 1: *Adjusted means (adjusted for positivity towards the ASMRtist) for change in mood (SDHS) after watching the video for each mental health symptom and ASMR experience groups*

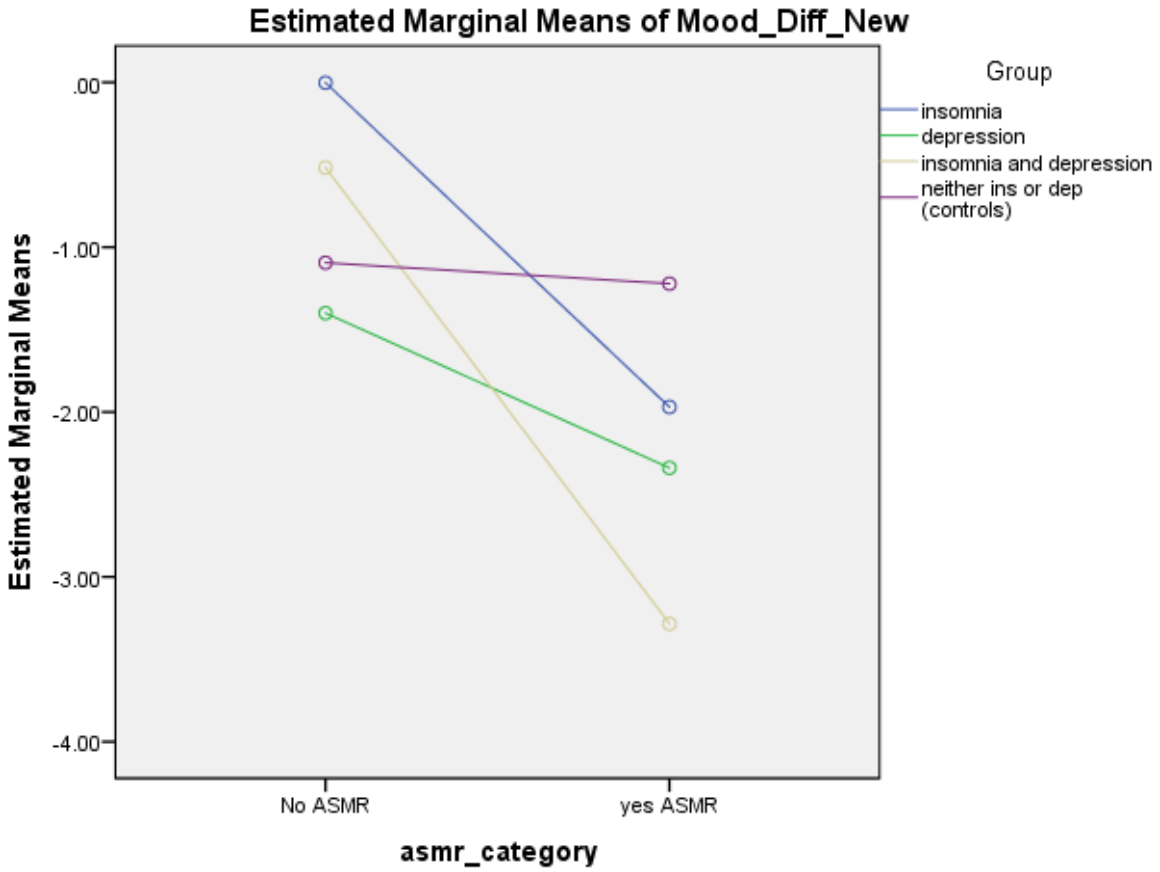
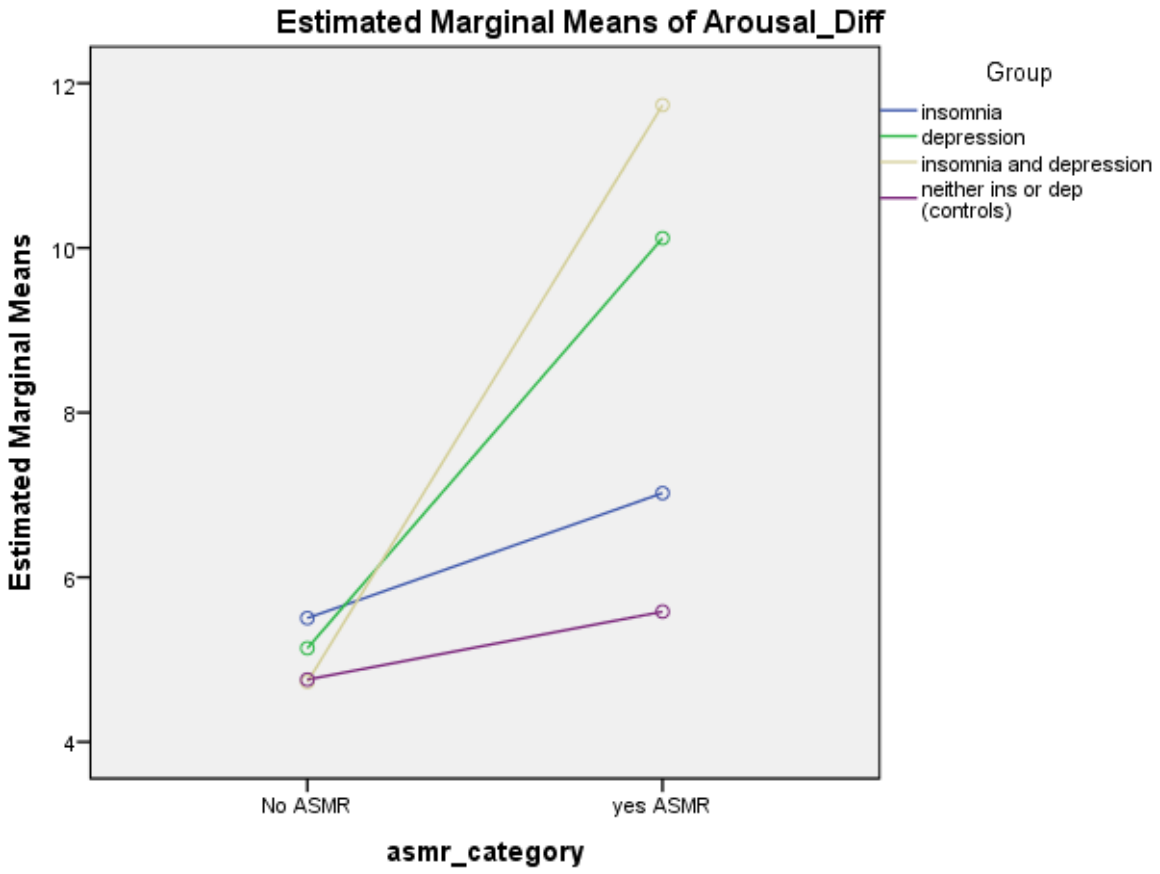


Figure 2: *Adjusted means (adjusted for positivity towards the ASMRtist) for change in arousal (PSAS) after watching the video for each mental health symptom and ASMR experience groups*



Covariates appearing in the model are evaluated at the following values: Positivity = 9.01