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An online survey on clinical and healthy individuals with auditory verbal hallucinations: Abuse did not lead to more negative voice content

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ABSTRACT

Despite the clinical and theoretical importance of the negative content in auditory verbal hallucinations (AVHs), little research has been conducted on the topic. A handful of studies suggest that trauma or adverse life events contribute to negative content. The findings are somewhat inconsistent, however, possibly due to methodological limitations. Moreover, only trauma occurring in childhood has been investigated so far. In the present study, we studied the effect of abuse, experienced in either child- or adulthood, and clinical status on negative content of AVHs in four groups of participants that were assessed as part of a large, previously published online survey: Individuals with a psychotic disorder and AVHs (total $n = 33$), who had experienced abuse ($n = 21$) or not ($n = 12$) as well as a group of healthy individuals with AVHs (total $n = 53$), who had experienced abuse ($n = 31$) or not ($n = 22$). We hypothesized that having experienced abuse was associated with a higher degree of negative content. The clinical group collectively reported significantly higher degrees of negative AVHs content compared to the healthy group, but there was no effect of abuse on the degree of negative AVHs content. The presence of AVHs was more common amongst individuals who reported a history of abuse compared to individuals with no history of abuse, both in clinical and healthy participants with AVHs. This implies that at group level, being subjected to traumatic events increases an individual's vulnerability to experiencing AVHs. However, it does not necessarily account for negative content in AVHs.

1. Introduction

Auditory verbal hallucinations (AVHs) refer to the experience of hearing one or more voices in the absence of an external source (David, 2004). Although a very common symptom in patients with psychosis and various other mental disorders such as mood disorders and schizophrenia spectrum disorders, epidemiological studies have observed that they also occur in healthy individuals (for a review, see Johns et al., 2014). Individuals who have been diagnosed with psychotic disorders (henceforth referred to as "clinical individuals") report significantly more negative content in their AVHs than healthy individuals with AVHs (de Boer et al., 2021; Daalman et al., 2011; Honig et al., 1998; Laloyaux et al., 2020), and this is associated with higher levels of distress (Daalman et al., 2011). For example, Laloyaux et al. (2020) compared clinical and healthy individuals with AVHs on several measures of AVHs phenomenology. One of the findings was that the clinical group reported a higher degree of negative content than the healthy group. A study by Daalman et al. (2011) found similar results. They had operationalized the emotional valence of AVHs (i.e., whether the emotional content of AVHs is negative or positive) as a sum of three question items extracted from the Psychotic Symptom Rating Scales (PSYRATS) - Auditory Hallucination Rating Scale (AHRS; Haddock et al., 1999); "amount of negative content of voices", "degree of negative content of voices" and "amount of distress". Clinical participants rated their AVHs as more negative and distressing compared to healthy participants with AVHs. Emotional valence also predicted that people who heard voices were in the clinical group in 88 % of the cases. This points to the importance of negative AVHs content and raises questions as to why some individuals experience predominately negative content.

Despite the clinical and theoretical importance of the negative AVHs

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content, little research has been conducted on factors that may be involved (Larøi et al., 2019). A few of those factors have been suggested, however, most notably trauma (Larøi et al., 2019). Although studies have found associations between, for example, childhood trauma and the presence of AVHs (Daalman et al., 2012; Sommer et al., 2008), the evidence is inconclusive regarding the impact of trauma specifically on negative AVHs content. Larøi et al. (2019) point to several pathways by which trauma might influence the emotional valence of AVHs content. For instance, traumatic experiences can lead to a continuing sense of threat, leaving the individual vulnerable to misinterpreting ambiguous or weak auditory signals as real sounds (Dodgson and Gordon, 2009; Larøi et al., 2019). Another suggestion is that some AVHs can be understood as a form of dissociation or misinterpretation of intrusive memories (Bortolon et al., 2021; Larøi et al., 2019; Pilton et al., 2015). Furthermore, increased sensitivity to stress, maladaptive emotion regulation strategies, and negative schemas (i.e., broad cognitive representations of self, others, and the world) are consequences of trauma that could potentially influence the content of AVHs (Larøi et al., 2019). The possible influences of trauma on negative AVHs content are intriguing and not yet adequately understood. The following will summarise four studies that have investigated the relationship between trauma and negative AVHs content.

Daalman et al. (2012) investigated whether childhood trauma was associated with AVHs in general or only with AVHs with negative emotional content. The sample consisted of 100 participants with psychotic disorders and AVHs (62 with schizophrenia, 14 with schizoaffective disorder and 24 with psychosis not otherwise specified), 127 healthy participants with AVHs and 124 healthy controls without AVHs. "Emotional valence" of content was operationalized in the same way as in Daalman et al. (2011). Childhood trauma was measured by the Childhood Trauma Questionnaire – Short Form (Bernstein et al., 2003). The clinical and healthy AVHs groups were significantly more likely to have experienced emotional and sexual abuse, compared to the control group. However, none of the five types of childhood trauma measures (emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect) were able to predict the emotional valence of the AVHs. Finally, childhood trauma and emotional valence of content were not significantly correlated. The results confirmed that traumatic experiences in childhood were associated with the presence of AVHs in adult age, but trauma exposure could not predict the emotional valence of the voices or the amount of distress they caused.

Rosen et al. (2018) tested whether levels of childhood adversity would predict levels of negative voice-content in a sample of individuals with diagnosed psychotic disorders (48 with schizophrenia and 13 with bipolar disorder). Negative content was operationalized by summing up the scores on items 6, "amount of negative content", and 7, "degree of negative content" from the PSYRATS (Haddock et al., 1999) into a "negative voice content" variable. In addition, participants completed the Adverse Childhood Experiences (ACE) questionnaire (Reavis et al., 2013). Results showed that childhood adversity predicted negative content and AVHs-related distress, and negative content fully mediated the association between adversity and distress.

Scott et al. (2020) examined childhood trauma, attachment styles, and negative schemas in relation to negative AVHs content. To measure negative content, participants were asked to estimate what proportion of their voices they experienced as negative. Childhood trauma was measured by the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998, as cited in Scott et al., 2020). The sample consisted of 140 participants with current or past AVHs and a diagnosis of schizophrenia, schizoaffective disorder, major depressive disorder, or bipolar disorder. Structural equation modelling was used to explore the relationships amongst the variables. They did not find a direct effect of childhood trauma on voice content. However, they found that childhood trauma, attachment styles, and negative schemas together predicted how negative the voices were perceived. This suggests that complex mechanisms are involved, and that (childhood) trauma alone cannot significantly explain negative AVHs content.

Finally, Begemann et al. (2021) examined experiences of AVHs in relation to subcategories of traumatic experiences in childhood. The sample consisted of 166 participants with a diagnosed psychotic disorder and AVHs (schizophrenia, schizoaffective disorder or psychosis not otherwise specified), 122 healthy participants with AVHs, and 125 healthy controls without AVHs. As in Rosen et al. (2018), negative voice content was measured by the PSYRATS items 6 and 7. The CTQ was administered, and cluster analysis was performed to form groups based on the trauma subtypes in the CTQ. They were left with three clusters: "low trauma", "emotion-focused trauma", and "multi-trauma". The multi-trauma group scored higher on all but one trauma subtype (emotional neglect). This group reported a larger amount of negative content in their AVHs compared to the two other groups. The authors suggest that experiencing high levels of childhood trauma across a range of subtypes may lead to more negative voice content. However, since the multi-trauma group mainly consisted of participants from the clinical population, it is not clear whether there is a direct effect of trauma on negative content, or if this effect was mediated by the presence of a psychotic disorder.

The inconsistent findings described above may be related to methodological differences in the operatinonalization of negative content in AVHs, how trauma was measured, and which groups were included. Negative AVHs content has been operationalized in several different manners. For instance, Daalman et al. (2011, 2012) included degree of distress in their measure of negative content. Although negative AVHs content and distress are strongly associated (Rosen et al., 2018; Woodward et al., 2014), they are two different constructs. AVHs content refers to the meaning of what the voices are saying, as it is interpreted by the individual, whereas distress is the negative emotional reaction to the AVHs. AVHs can cause distress regardless of the emotional valence of the content. It is also possible to hear negative AVHs without feeling distressed (Larøi et al., 2019). Therefore, including distress in the operationalization of negative AVHs content leaves the results difficult to interpret.

Begemann et al. (2021), Scott et al. (2020), and Rosen et al. (2018) examined negative AVHs content in a more clear-cut manner than Daalman et al. (2011, 2012), however, one might point to limitations in their operationalizations as well. Rosen et al. (2018) and Begemann et al. (2021) applied the PSYRATS to measure a range of aspects regarding AVHs. When extracting items to form a negative content variable, they used both items targeting content, namely "amount of negative content" and "degree of negative content". In Scott et al.'s study (2020), only amount of negative content was measured by asking the participants to estimate the proportion of negative AVHs. It is common to hear both positive and negative content in AVHs (Bless et al., 2018). When participants are asked what amount of their AVHs is negative, they must also evaluate the amount of positive and neutral content to give a relative estimate. For this reason, only asking for amount, or combining amount and degree into one item, might be less optimal.

In addition to the issue of operationalizing AVHs content, another limitation is related to the scarceness of comparisons between clinical and healthy participants. Rosen et al. (2018) and Scott et al. (2020) only included samples of participants with psychiatric diagnoses in their studies. Begemann et al. (2021) conducted their study with a sample of both healthy and clinical participants. However, they did not make proper comparisons between these groups, as the participants were clustered into trauma-groups that had different proportions of clinical and healthy participants. Comparing AVHs phenomenology between clinical and healthy groups is important for several reasons. Psychotic disorders entail a range of symptoms that influence each other, making confounding effects on negative AVHs content likely to take place. Thus, the inclusion of healthy participants with AVHs allows the opportunity to study AVHs that are less likely to be influenced by confounding symptoms. Furthermore, factors underpinning the emotional valence of content may differ between the two groups. Thus, the inclusion of both

clinical and healthy participants is important in order to get a better understanding of how AVHs may become pathological.

A final limitation regards the measure of trauma. The previous studies have solely investigated the effect of traumatic experiences that happened during *childhood*. Childhood trauma is associated with a range of adverse consequences, such as insecure attachment (for a review, see Breidenstine et al., 2011), emotional dysregulation (Tottenham et al., 2010), and psychological problems (for a review, see Gilbert et al., 2009). However, traumatic experiences in adult age are also associated with negative outcomes such as increased rates of psychiatric disorders (Thompson et al., 2003; Zlotnick et al., 2008), yet few studies on AVHs have also included adult trauma.

The aim of the present study was to improve our understanding of negative content in AVHs. Building on previous findings, we investigated the effect of traumatic experiences, irrespective of when the trauma occurred. An exploratory factor analysis of potentially traumatic life experiences (see details below) found that we had chiefly two types of such experiences: (1) common adverse life experiences such as marriage problems or unemployment and (2) various types of abuse. We decided to specifically focus on abuse as this latter type of negative adverse event (compared to the former type) is the more severe of the two and potentially more likely to lead to post-traumatic stress and thus is probably more likely to be involved in negative AVHs content. We hypothesized that individuals with a history of abuse reported a higher degree of negative AVHs content compared to individuals with no history of abuse. We also examined whether this would be similar or different in clinical compared to healthy individuals with AVHs.

2. Methods

2.1. Participants

This study is part of a larger online survey that was accessible between August 2017 until the end of June 2018. The online survey was visited by a total of 46,916 people. Participants were excluded based on the following criteria: 1) they only entered the first page, 2) they reported an age < 18 or an aberrant age, 3) they had missing data or 4) they did not pass a validity check. Six validity items were included: two items designed to detect lies, two items to detect random answers or attention lapses, and two items to detect malingering of psychotic symptoms. A total validity score was computed, and participants with a score of ≥3 were excluded. After exclusion criteria were applied, the final sample in the present study consisted of 2498 participants. For more details, please see Laloyaux et al. (2020).

2.2. AVHs-subgroups

The presence or absence of a psychotic disorder and the presence or absence of AVHs were used to form three subgroups: 1) clinical participants with AVHs ($n = 33$), 2) healthy participants with AVHs ($n = 53$), and 3) healthy participants without AVHs ($n = 2412$). The categorization of participants as clinical was based on self reported answers to questions about mental health diagnosis and medication. Participants had to self-report a diagnosis of schizophrenia and/or bipolar disorder to be categorized into the clinical AVHs group. To be categorized into the non-clinical AVHs group, the following criteria had to be fulfilled: absence of a psychiatric or neurological disorder, they have never consulted a psychiatrist, they have never taken antipsychotic medication, and they have not consumed any illicit drugs (except for cannabis). Three items from the Launay Slade Hallucination Scale (Larøi & Van der Linden, 2005; Launay & Slade, 1981) were used to determine if participants experienced AVHs. For more detail regarding the inclusion and exclusion criteria of these subgroups, and for demographics, see Laloyaux et al. (2020).

For the purpose of the present study, we further subdivided both clinical and healthy participants with AVHs into those who experienced abuse and those who did not. See below for details.

2.3. Materials

2.3.1. Negative voice content

In the present study, we were interested in the experienced degree of negative AVHs content. This was measured by using a single, straightforward question: "To what degree are the voices you are hearing negative?". Answers ranged from 1 (*not negative at all)* to 7 (*very negative*).

2.3.2. Traumatic experiences

To measure potentially traumatic experiences, participants were asked: "Have you ever experienced any of the following?", followed by a list of life events (see Table 1). The life events were based on items from a broad population study in Norway (Holmen et al., 2013). Participants gave their answer by ticking the corresponding life events.

2.4. Data analysis

All analyses were conducted using the IBM SPSS Statistics version 28.

2.4.1. Pre-analysis of traumatic experiences

To test our hypothesis, we wanted to extract items that reflect experiences that are likely to cause traumatic stress. The experiences included in the questionnaire have a broad scope, ranging from common experiences (e.g., moving out, divorce, heartbreak) to more severe experiences associated with posttraumatic pathology (e.g., sexual abuse, neglect). To identify and group similar experiences, an exploratory factor analysis was performed using Principal Axis Factoring as extraction method. The factor analysis was carried out for the entire sample to have a more general basis for the clustering of items/experiences and to increase statistical power. One item/experience («war») was excluded from the analysis due to a low n (=9), leaving 15 items. The matrix of loadings was rotated to obtain oblique factors (Direct Oblimin), as many of the factors were correlated. Small correlations (<*0.*3) were suppressed in the analysis.

The Kaiser-Meyer-Olkin Test and Bartletts Test of Sphericity indicated that the data were suited for factor analysis (KMO = 0.946, Bartlett's test significant at $p < .001$.). The pattern matrix suggested a two-factor solution (see Table 1). This was confirmed by a Monte Carlo simulation, for which we used the tool «Monte Carlo PCA for parallel analysis (Watkins, 2000). Only the first two eigenvalues of the randomly generated eigenvalues of the Monte Carlo simulation (1.13 and 1.10)

Table 1
Factor structure of the life adversities questionnaire.

	Factor 1	Factor 2
Factor 1: life adversities		
Heart-break	0.775	
Divorce/separation	0.703	
Moved out from home	0.675	
Marriage problems	0.651	
Death of a loved one	0.643	
Serious disease (self or family member)	0.607	
Emotional problems (e.g., depression, anxiety)	0.543	−0.308
Unemployment	0.472	
Bullying	0.426	−0.333
Relationship problems	0.418	−0.352
Accident	0.346	
Factor 2: abuse		
Emotional abuse		−0.707
Physical abuse/violence		−0.700
Sexual abuse		−0.700
Neglect		−0.615

Note. The item «war» was excluded from analysis due to too few respondents.

were below the eigenvalues of the actual dataset (6.83 and 1.19). The simulation was carried out for 15 variables, 2498 participants, and 100 replications. Factor 1 explained 45.5 % and factor 2 explained 7.9 % of the total variance.

Items loading on Factor 1 reflect life adversities and experiences that are rather common and potentially less likely to lead to post-traumatic stress. The highest loading items was experiences of heartbreak and divorce/separation. The items loading on Factor 2 represent experiences that are presumably more strongly associated with post-traumatic stress. These were emotional abuse, physical abuse, sexual abuse, and neglect. Some items loaded on both factors, such as emotional problems (anxiety, depression) as well as bullying and relational issues. However, these factors loaded significantly stronger on Factor 1 than on Factor 2.

The four items loading strongly on Factor 2 (emotional abuse, physical abuse, sexual abuse, and neglect) were selected to create a new variable for further analysis. As neglect in childhood can be argued to be a form of abuse, the new variable was named *abuse* and defined as a positive answer to one or more of these items. Participants who had experienced either emotional abuse, physical abuse, sexual abuse or neglect, were classified as «abuse», and participants who did not report any of these experiences were classified as «no abuse». The demographics of those four groups are described below.

2.4.2. Impact of abuse on negative content of AVHs

A 2 (clinical vs. healthy) by 2 (abuse vs. no abuse) ANOVA was performed with degree of negative content (on a scale from 1 to 7) as the dependent variable. Group differences were considered statistically significant at a p-value <.05. One healthy participant with AVH, who did not experience abuse as defined above, did not provide a negative content score and was thus excluded from this analysis. However, the participant remained in all other analyses.

2.4.3. Supplementary analysis

Two Chi-Square Tests of Independence were performed to assess the relationship between trauma and the presence of AVHs. First, participants with AVHs (both clinical and healthy) were compared to healthy controls. Second, clinical participants with AVHs were compared to healthy participants with AVHs.

3. Results

3.1. Demographics

The demographic characteristics of the four groups (clinical versus healthy participants with AVHs, participants with abuse versus no abuse are presented in Table 2. There were generally more female (n = 80) than male (n = 6) participants, X^2 (3, N = 86) = 2.58, p < .001, but men were underrepresented in all four AVHs subgroups. The association between gender and AVH subgroup could not be analyzed with chi square tests due to too few male participants. For the same reason, no chi square test was performed for education/AVHs subgroups. We assessed possible age differences with a univariate ANOVA. The dependent variable was age, "Group" served as a between-subjects variable. There was no main effect "Group", F(3, 82) = 1.30, p = .279, partial η2 = 0.046″ and no individual post-hoc comparison was significant after Bonferroni adjustment (all $p \geq .452$), suggesting that the four groups were comparable in terms of age.

Table 2
Overview of participants with AVHs.

	Clinical AVHs		Healthy AVHs		Total
	Abuse	No abuse	Abuse	No abuse	
Gender (male/female)	1/20	0/12	2/29	3/19	6/80
Age (Mean ± SD)	35.1 ± 10.8	29.8 ± 8.3	36.6 ± 10.8	32.6 ± 12.8	34.3 ± 11.1
Education					
Elementary school	4	1	2	5	12
Middle school	1	0	0	1	2
Technical/vocational high school	4	2	5	4	15
High school	3	4	10	6	23
Higher education (<4 years)	7	4	7	4	22
Higher education (4 years or more)	2	1	7	2	12
Total	21	12	31	22	86

3.2. Impact of abuse on negative content of AVHs

The ANOVA revealed a significant main effect AVHs-subgroup, F (1, 81) = 32.49, p < .001, partial η^2 = 0.286. Clinical groups reported more negative content than healthy individuals (Table 3). There was no significant main effect of abuse, F (1, 81) = 0.36, p = .552, partial η^2 = 0.004, and the interaction between abuse and AVHs-subgroup also did not reach significance, F (1, 81) = 0.10, p = .759, partial η^2 = 0.001.

3.3. Supplementary analyses

There was a significant relationship between AVHs and abuse when comparing *all* participants with AVHs, irrespective of whether they were clinical or healthy voice hearers, to all participants without AVHs, X^2(1, N = 2498) = 117.35, p < .001. Of the participants *with* AVHs, 60.5 % had reported experiencing abuse, as defined above, while only 15.6 % of participants *without* AVHs reported abuse. The effect size was small to medium (φ = 0.217). A similar proportion of clinical (63.6 %) and healthy voice hearers (58.5 %) reported abuse as defined above, X^2(1, (N = 86) = 0.23, p = .635, φ = 0.051.

4. Discussion

The present study aimed to investigate whether trauma impacts the negative content of AVHs. It was hypothesized that individuals with a history of abuse report a higher degree of negative AVHs content compared to individuals with no history of abuse. In line with previous findings (Baumeister et al., 2021; Daalman et al., 2012), the *presence* of AVHs in both the clinical and healthy group was associated with a history of abuse. However, the hypothesis was not supported, as the *degree of negative content* was not higher amongst participants who reported experiences of abuse. In line with the claims of Daalman et al. (2012), the findings from the present study suggest that abuse may increase the general vulnerability of experiencing AVHs, but that is not necessarily reflected in higher degrees of negative content.

Although not everyone who experiences abuse develops trauma-related disorders, such as post-traumatic stress disorder, all four types of abuse are featured as traumatic events in the literature. The notion that trauma may underpin a general vulnerability for AVHs should strengthen the interest for biological and cognitive mechanisms that may be involved. A vast amount of human and animal research has

Table 3
Self-reported degree of negative content of AVHs.

AVH-group	Abuse	Mean	*SD*	*n*
Healthy	No abuse	2.95	1.431	21
	Abuse	2.58	1.876	31
	Total	2.73	1.705	52
Clinical	No abuse	5.17	1.946	12
	Abuse	5.05	1.884	21
	Total	5.09	1.877	33
Total	No Abuse	3.76	1.937	33
	Abuse	3.58	2.226	52
	Total	3.65	2.108	85

Note. Higher values denote higher degrees of negative content (range 1–7).

shown that traumatic stress is associated with aberrations in the limbic structures (including the hippocampus and amygdala) of the brain (for reviews, see Lisieski et al., 2018; Sapolsky, 2003; Tottenham and Sheridan, 2010). One possibility is that such alterations can render traumatized individuals vulnerable to experience hallucinations. For instance, Daalman et al. (2012) speculate that trauma-induced changes in the connectivity between the hippocampus and the parahippocampal gyrus may be involved. The parahippocampal gyrus is involved in transferring memory information to the hippocampus. The authors suggest that changes in the connectivity may lead to AVHs by erroneous activation of memory information.

Another mechanism that has been suggested to be involved in the association between trauma and AVHs is dissociation. Dissociation can be defined as a "lack of the normal integration of thoughts, feelings, and experiences into the stream of consciousness" (Bernstein and Putnam, 1986, p.727), and it is a core feature of posttraumatic symptomatology (American Psychiatric Association, 2013). Previous studies found associations between dissociation and AVHs in participants with psychosis (Perona-Garcelan et al., 2012). Dissociation has also been found to mediate the association between childhood trauma and hallucination-proneness in participants with psychotic disorders (Varese et al., 2012). One suggested mechanism behind this association is that deficits in cognitive inhibition lead to difficulties with separating external and internal events (e.g., intrusive thoughts, Varese et al., 2012; Waters et al., 2012). It is possible that trauma-induced deficits in cognitive inhibition may increase the chances of experiencing AVHs in general, regardless of the emotional valence of the content, which would be in line with the present results.

The present findings can be discussed in a wider perspective, in light of a proposed discrepancy between a "pseudo-dimensional" and a "fully-dimensional" view of psychotic- like experiences (Baumeister et al., 2017; DeRosse and Karlsgodt, 2015). In a pseudo- dimensional view, psychotic-like experiences are thought to vary on a continuum of severity, but only in a small proportion of the population. The symptoms are viewed as directly related to distress and the need for treatment. Contrarily, in a fully dimensional view, the experiences are believed to vary dimensionally in the general population, without necessarily being related to distress or need for help. In this perspective, healthy individuals with AVHs are expected to have more in common with healthy controls on measures of, for example, risk factors (Baumeister et al., 2017; DeRosse and Karlsgodt, 2015). The lack of a significant difference between clinical and healthy individuals with AVHs in terms of trauma prevalence supports a pseudo-dimensional view of AVHs. The trauma prevalence in the healthy AVHs-group was much closer to the clinical group than to the group of healthy participants without AVHs. This suggests that trauma is a risk factor for developing both clinical and healthy AVHs. Still, it should be pointed out that the trauma variable in this study was dichotomized – participants were divided into "abuse", or "no abuse" based on the mere presence of potentially traumatic events. This dichotomization can thus be considered a limitation of the present study, as it does not take severity into account. Future studies should therefore consider including continuous measures of subjective experience of abuse severity, and/or posttraumatic symptomatology.

The question of whether AVHs are distributed in a pseudo-dimensional or a fully dimensional way also calls for longitudinal studies to investigate the development of AVHs over time. Psychotic disorders are often preceded by a prodromal phase, in which symptoms are less severe (Yung and McGorry, 1996). Thus, at least some proportion of the healthy AVHs- group may later develop a psychotic disorder, and perhaps experience a shift in the emotional valence of their AVHs. Studying negative AVHs content in the same individuals over a longer period could answer these questions.

The underlying causes of negative AVH content still remains largely unknown, and therefore efforts should be undertaken to further investigate the underlying factors. One possibility is that recent experiences (e.g., common life adversities) have more influence on AVHs content compared to traumatic experiences that occurred much further back in time (e.g., childhood trauma in adults). For instance, Corstens and Longden (2013) found that a broad range of stressful life events precedes the onset of voice hearing, the most frequent being family conflict, emotional abuse, severe personal criticism, and sexual abuse. The content in the voices often represented social and emotional problems such as problems with self-esteem, anger, shame and guilt, as well as attachment and intimacy. It is possible that a history of trauma leads to a vulnerability of experiencing AVHs, while the AVHs content is dynamically affected by recent stressful life events. Also, culture has been found to influence the content and characteristics of hallucinations (Larøi et al., 2014), and would be an interesting subject for future studies of AVHs emotional valence.

Baumeister et al. (2021) found that trauma exposure in childhood or adolescence/adulthood did not differ between clinical and healthy individuals with AVHs. Future studies should look into how trauma during distinct life periods may influence the negative content of AVHs. The age when individuals were exposed to traumatic events could be an important moderator in the relationship between trauma and negative voice content. The survey in the present study did not include a corresponding item, which should be added in future investigations.

Furthermore, research on negative AVHs content has mainly focused on risk factors, probably due to extensive research that has identified risk factors for developing psychosis (Radua et al., 2018). In contrast, the evidence base is small and inconclusive regarding protective factors against psychotic symptoms (Oliver et al., 2020; Radua et al., 2018). A few studies have identified personal factors such as resilience and self-compassion as protective against AVHs-related distress (Laloyaux et al., 2020; Norman et al., 2020). Future studies should focus on factors that may protect against negative AHVs content. This would advance our understating and provide important cues as to how treatment interventions can reduce negative AVHs content.

Beyond those already discussed, the present paper has further limitations. Self-report data carry a risk for biases, such as extreme responding (Paulhus and Vazire, 2007), social desirability (Van de Mortel, 2008) and recall bias (Faravelli et al., 2017). Participants were divided into subgroups based on self-reported diagnoses and medication, which was not confirmed by a clinician. Also, the size of these subgroups was small, limiting both the statistical power and the generalizability of the finding. Another limitation is that the sample consisted mostly of women, and exclusively internet users, which limits the external validity. Due to the cross-sectional design of the study, we cannot draw conclusions about causality. Finally, negative content was operationalized based on a single item which has yet to be examined psychometrically.

5. Conclusion

The aim of the present study was to improve our understanding of negative content in AVHs in clinical and healthy individuals. It was hypothesized that individuals with a history of abuse, self-report a higher degree of negative AVH content compared to individuals with no such history. The results showed that abuse was more frequently reported amongst clinical and healthy participants with AVHs compared to healthy controls, but that abuse was not related to the degree of negative AVHs content. This implies that abuse may increase the vulnerability of experiencing AVHs, regardless of the emotional valence of the content.

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Declaration of competing interest

We declare that there are no conflicts of interests associated with the submission of our manuscript entitled "An online survey on clinical and healthy individuals with auditory verbal hallucinations: Abuse did not lead to more negative voice content".

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