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Auditory hallucinations, not necessarily a hallmark of psychotic disorder

F. Waters^{1,2*}, J. D. Blom^{3,4,5}, R. Jardri⁶, K. Hugdahl^{7,8} and I. E. C. Sommer⁹

¹Clinical Research Centre, Graylands Health Campus, North Metropolitan Area Health Service Mental Health, Perth, Australia

²School of Psychological Science, University of Western Australia, Perth, Australia

³Faculty of Social Sciences, Leiden University, Leiden, the Netherlands

⁴Parnassia Psychiatric Institute, The Hague, the Netherlands

⁵Department of Psychiatry, University of Groningen, Groningen, the Netherlands

⁶Univ Lille, CNRS UMR-9193, SCALab & CHU Lille, Psychiatry Department, CURE Platform, Fontan Hospital, Lille, France

⁷Division of Psychiatry, Haukeland University Hospital, Bergen, Norway

⁸Department of Biological and Medical Psychology, University of Bergen, Bergen, Norway

⁹Department of Neuroscience and Department of Psychiatry, University Medical Center Groningen, Groningen, the Netherlands

Auditory hallucinations (AH) are often considered a sign of a psychotic disorder. This is promoted by the DSM-5 category of Other Specified Schizophrenia Spectrum And Other Psychotic Disorder (OSSSOPD), the diagnostic criteria for which are fulfilled with the sole presence of persistent AH, in the absence of any other psychotic symptoms. And yet, persistent AH are not synonymous with having a psychotic disorder, and should therefore not be uncritically treated as such. Many people who seek treatment for persistent AH have no other psychotic symptoms, have preserved reality-testing capacities, and will never develop a schizophrenia spectrum disorder. Instead, hallucinations may be the result of many different causes, including borderline personality disorder, post-traumatic stress disorder (PTSD), hearing loss, sleep disorders or brain lesions, and they may even occur outside the context of any demonstrable pathology. In such cases, the usage of the DSM-5 diagnosis of OSSSOPD would be incorrect, and it may prompt unwarranted treatment with antipsychotic medication. We therefore argue that a DSM-5 diagnosis of Schizophrenia Spectrum Disorder (or any other type of psychotic disorder) characterized by AH should require at least one more symptom listed under the A-criterion (i.e. delusions, disorganized speech, disorganized or catatonic behavior or negative symptoms). Adhering to these more stringent criteria may help to distinguish between individuals with persistent AH which are part of a psychotic disorder, for whom antipsychotic medication may be helpful, and individuals with AH in the absence of such a disorder who may benefit from other approaches (e.g. different pharmacological interventions, improving coping style, trauma-related therapy).

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Introduction

In the general community, and even among health professionals, the presence of auditory hallucinations (AH) is often considered synonymous with having a psychotic disorder (Parnas, 2013; Ford *et al.* 2014). This view is promoted by the diagnostic criteria for *Other Specified Schizophrenia Spectrum and Other Psychotic Disorder* (OSSSOPD), a diagnostic category first introduced in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatry Association, 2013). For related categories in the schizophrenia spectrum, such as Schizophrenia, Schizophreniform Disorder, and Schizoaffective

Disorder, at least two symptoms are required from those listed under the A-criterion (comprising delusions, hallucinations, disordered thinking, disorganized or catatonic behavior, and negative symptoms). To meet the DSM-5 criteria for a diagnosis of OSSSOPD, however, the sole presence of persistent AH is sufficient. This is at odds with the fact that AH are experienced frequently in the context of other conditions, and sometimes even in the absence of any demonstrable pathology. Given that persistent AH are not always associated with a loss of contact with reality, lack of insight, or compromised dopaminergic transmission, it is questionable whether these types of AH should be treated with antipsychotic medication. Getting this issue right is also important given the stigma associated with a diagnosis of psychotic disorder and possible consequences for prognosis.

In this paper, we argue for a clearer distinction between AH as part of a psychotic disorder and those

* Address for correspondence: F. Waters, Clinical Research Centre, c/o Graylands Hospital, Private Bag No 1, Claremont, WA 6910, USA.
(Email: flavie.waters@health.wa.gov.au)

experienced in a different context, as the former may be an indication for antipsychotic drugs, while the latter may benefit from an alternative therapeutic approach. In what follows, we (i) consider the representation of hallucinations in the DSM-5 chapter on Schizophrenia Spectrum Disorders; (ii) highlight the crucial difference between psychotic disorders and psychotic symptoms; (iii) document alternative disorders with AH as a prominent feature which occur in relative isolation, i.e. in the absence of any other psychotic symptoms; (iv) discuss biological, environmental, and psychological explanations for AH that do not involve dopamine; and (v) consider whether AH are a risk factor for later psychosis. On the basis of these insights, we advocate a more stringent use of the DSM's A-criterion, requiring the presence of at least two symptoms in cases of OSSSOPD. Although the focus here is on nonverbal and verbal AH (i.e. 'voices'), our argument also applies to hallucinations experienced in other sensory modalities (i.e. visual, somatic, etc.).

Hallucinations as a symptom domain in the DSM-5

According to the DSM-5, Schizophrenia and Schizophreniform Disorder are diagnosed in the presence of two or more symptoms listed under the A-criterion, along with signs of persistence, distress, and impairments in functioning. One of the changes made after the DSM-IV was to drop the use of Schneiderian first-rank symptoms, including voices conversing and third-person hallucinations (Esquirol, 1845). Consequently, it is now possible to establish a diagnosis of Schizophrenia or Schizophreniform Disorder whenever hallucinations are present, regardless of form or content, as long as they are accompanied by a second symptom from the A-criterion, together with significant distress or impairment in functioning (APA, 2013).

The category OSSSOPD was devised for clinical presentations that are deemed 'characteristic' of the group of Schizophrenia Spectrum Disorders, but which do not meet all the diagnostic criteria of Schizophrenia or Schizophreniform Disorder. The diagnosis can be established in the sole presence of persistent AH, i.e. in the absence of any other features (Box 1). An important benefit of this low-threshold residual category is that it helps to alert health professionals to the presence of AH in need of treatment, even in the absence of additional symptoms required for a diagnosis of Schizophrenia. Thus, patients suffering exclusively from distressing and burdensome hallucinations (for example command hallucinations) can be treated without delay. However, this creates a new problem of overinclusion, because any individual presenting with AH may now become labelled as having a psychotic disorder, even if the primary condition is a somatic disorder (e.g. migraine or

Box 1. DSM-5 criteria for Other Specified Schizophrenia Spectrum and Other Psychotic Disorder (OSSSOPD)

This category applies to presentations where are prominent symptoms characteristic of schizophrenia spectrum disorders that cause clinically significant distress or impairment in social, occupational, or other important areas of functioning but do not meet the full criteria for schizophrenia, schizophreniform disorder or schizoaffective disorder. The OSSSOPD category is used in situations in which the clinician chooses to communicate that the presentation does not meet the criteria for a more specific schizophrenia spectrum disorder, and allows him or her to provide a specific reason for this (e.g. 'persistent auditory hallucinations').

Examples of presentations that can be specified using the 'other specified' designation include the following:

- (1) *Persistent auditory hallucinations* occurring in the absence of any other features.
- (2) *Delusions with significant overlapping mood episodes*: This includes persistent delusions with periods of overlapping mood episodes that are present for a substantial portion of the delusional disturbance (such that the criterion stipulating only brief mood disturbance in delusional disorder is not met).
- (3) *Attenuated psychosis syndrome*: This syndrome is characterized by psychotic-like symptoms that are below a threshold for full psychosis (e.g. the symptoms are less severe and more transient, and insight is relatively maintained).
- (4) *Delusional symptoms in partners of individual with delusional disorder*: In the context of a relationship, the delusional material from the dominant partner provides content for delusional beliefs by an individual who may not otherwise entirely meet criteria for delusional disorder.

Parkinson's disease), other psychiatric disorder (e.g. dissociative disorder or personality disorder) or not demonstrable at all. The risk is that patients might be given unnecessary treatment and suffer from stigmatization. Incidentally, the risk of overinclusion is not unique to Schizophrenia Spectrum Disorders (Berrios, 1996), but this issue has received little attention in the literature.

Psychotic disorder v. psychotic symptom

Psychosis is a broad and rather non-specific term (David & Ajnakina, 2016). It has been in use since the 1900s, when physicians began attributing mental disorders (or 'insanities') to underlying disorders of the brain. Since then, the term is featured in virtually every textbook of psychiatry, but is seldom explicitly defined. Even Sims (Sims, 2003), whose crystal-clear definitions of psychopathology have instructed generations of psychiatrists, has little more to say than that psychoses are '*exceedingly hard to define although they are usually said to be characterized by severe symptoms, such as delusions and hallucinations, and by lack of insight (...); there is loss of contact with reality.*' In clinical practice, the term psychosis loosely encompasses a spectrum of diagnostic syndromes which includes schizophrenia and related disorders, the affective

psychoses (i.e. major depressive disorder and bipolar disorder), substance-induced psychoses and withdrawal states, psychoses caused by a somatic disorder, and psychotic states associated with neurodegenerative disorders such as dementia, Parkinson's disease and Huntington's disease. Delirium is also sometimes included as a type of psychosis.

The term 'psychosis' therefore lacks a definition which provides meaning by specifying its necessary and sufficient conditions (i.e. an intensional definition). Attempts to provide such an intensional definition in terms of 'loss of contact with reality' or 'lack of insight' fail to cover the meaning of psychosis. After all, a loss of contact with reality cannot be considered sufficient for psychosis, as this feature may occur in other disorders such as autism, depressive disorder or eating disorder; nor is it a necessary feature, since individuals suffering from hallucinations and negative symptoms may still be in contact with reality. The same holds true for lack of insight (David, 1990; Varga *et al.* 2006).

Instead, 'psychosis' owes its meaning to extensional definitions which vary somewhat between authors, but usually consist of lists of psychotic *symptoms* (such as those mentioned under the A-criterion above). If we ask ourselves why symptoms from that disparate group are called psychotic, we find that this serves to indicate that we consider them severe, and that we suspect them to signal a loss of contact with reality and/or a lack of insight. Moreover, historically, it suggests that we consider them to have a neurobiological cause even though the cause or mechanism may elude us. That is as close as we can currently get to an intensional definition of psychosis.

The question to be answered now, is whether all patients with one or more psychotic *symptoms* (such as persistent, stressful AH) should be considered as having an underlying psychotic *disorder*.

Persistent AH in non-psychotic disorders

It is widely recognized that AH can accompany virtually all psychiatric disorders, including borderline personality disorder and dissociative identity disorder (40%), unipolar depression and bipolar disorder (45%), anxiety disorders (14%), autism (6%), and post-traumatic stress disorder (15%) (Blom & Sommer, 2010; Sommer & Kahn, 2014). In addition, AH can be a symptom of disorders of the nervous system, including Parkinson's disease, stroke, and migraine (Vreeburg *et al.* 2016), tumors or lesions to the temporal lobe, brainstem or thalamus (Braun *et al.* 2003), sleep disorders (Fortuyn *et al.* 2009), or due to the effects of alcohol and drugs. Sensory disturbances due to conditions which affect the auditory pathways (e.g. hearing loss,

auditory cortex dysfunction, etc.) are also a common cause.

Hallucinations in these different groups of clinical disorders can be persistent and distressing, and be associated with a depressed mood, anxiety, and suicidal behavior (Honig *et al.* 1998; Okulate & Jones, 2003; Blom & Sommer, 2010; Kingdon *et al.* 2010; Preti *et al.* 2014). Even though such AH can also present with significant impairments in social, occupational and other areas of functioning, they are not always accompanied by problems with reality testing, lack of insight or disturbed beliefs, and therefore cannot be considered as part of a psychotic disorder.

Hallucinations in individuals in the general population

One such example is that of AH reported by individuals in the general population. In the so-called 'extended phenotype' (van Os *et al.* 2009), prevalence estimates of hallucinations vary from 4% to 21% (Beavan *et al.* 2011). Hallucinations in this group are often transient and sporadic in nature (Hanssen *et al.* 2005), although AH can be recurrent and persistent in a minority (4%) (McGrath *et al.* 2015). In this latter group, AH can be highly distressing in approximately 50% of cases (Honig *et al.* 1998; Daalman *et al.* 2011; Woods *et al.* 2015), and may last for over a year (Peters *et al.* 2016). In one study of 13 voice hearers in the general population, hallucinations had been ongoing for longer than 4 years in 89% of cases (Leudar *et al.* 1997). These types of hallucination present mostly without any other psychotic symptoms, and there is a marked absence of psychopathology but for schizotypal traits (Sommer *et al.* 2010).

Explanations for AH which do not involve dopamine

Dopamine has once been hailed as the 'wind of the psychotic fire' (Laruelle & Abi-Dargham, 1999), and antipsychotic medications with their antagonistic effects on dopamine receptors are routinely used to treat psychotic symptoms, whether or not in combination with psychosocial approaches. Evidence is accumulating, however, that the causes of AH do not always involve abnormal dopamine functions, raising questions about the systematic usage of antipsychotic medications for all symptoms considered as psychotic.

Pharmacological evidence

Dopaminergic overactivity in the striatum (Abi-Dargham *et al.* 1998) is the primary neuropharmacological explanation for positive symptoms in schizophrenia disorders. In support, Positron Emission Tomography (PET) studies using an F-Dopa tracer show that many

individuals with these disorders have increased pre-synaptic striatal dopamine production (Howes *et al.* 2011). Using the same method, a study in individuals from the general population (e.g. nonpsychotic) with frequent AH failed to show any such increases of striatal dopamine production (Howes *et al.* 2013). This perhaps suggests that individuals who participated in the latter study may not have benefited from antipsychotic treatment in the treatment of their hallucinations. In support, other PET studies indicate that targeting dopamine (D₂) receptors with antipsychotic medication is only beneficial for individuals with increased striatal dopamine production, and not for those with normal production levels (Demjaha *et al.* 2012; Ćurčić-Blake *et al.* 2017).

Consequently, it is perhaps not surprising that recent evidence is pointing to neurotransmitter systems other than dopamine in the mediation of AH (Deamer & Wilkinson, 2015). In regards to the glutamatergic system, for example, studies show elevated levels of glutamate and glutamine metabolites in the temporal and frontal brain regions of individuals diagnosed with schizophrenia with frequent and severe AH (Hayward *et al.* 2009; Hugdahl *et al.* 2015; Ćurčić-Blake *et al.* 2017). In addition, studies with ketamine show that drugs which alter glutamatergic neurotransmission are also capable of producing AH (Corlett *et al.* 2011). Such a role for the glutamatergic system cannot be linked directly to the dopamine hypothesis of psychotic disorders. Despite attempts to couple both views by considering a role for aberrant NMDA-R plasticity (Thomas *et al.* 2014), the glutamate system appears to form an alternative mediating pathway for AH, consistent with the heterogeneity of conditions in which such hallucinations present.

To complicate things further, hallucinations in different sensory modalities - even when experienced in the context of the same disorder - may be mediated by different types of neurotransmitter. In the case of visual hallucinations, for example, 5HT-2a receptors appear to play a pivotal role given that serotonin agonists such as LSD and psilocybin can produce vivid hallucinations, which can subsequently be blocked with serotonin (5HT-2A) antagonists such as ketanserin and ritanserin (Vollenweider, 1998). This evidence points to different neurotransmitter pathways for hallucinations in different sensory modalities, again forcing the conclusion that the dopamine hypothesis of schizophrenia does not provide an explanation for all types of hallucination.

Environmental and psychological explanations

Other evidence that dopamine is not always directly involved in AH stems from studies on environmental

and psychological factors. In vulnerable and older age groups, social isolation and withdrawal can be powerful causes for AH and other types of hallucination through the reduction of ordinary levels of sensory input. It has been speculated that the psychological effects of loneliness and social seclusion may prompt compensatory hypersensitivity of the perceptual network, with any hallucinations being projected outwards to meet the person's communicative needs (Hoffman, 2007). Psychological trauma is yet another potential cause for hallucinations. Some people can trace their symptom's onset back to traumatic events. This association has been found in many individuals diagnosed with schizophrenia who report abuse in childhood (Read *et al.* 2005), and to an even greater extent in individuals with borderline personality disorder and post-traumatic stress disorder experiencing AH. In the general community, traumatic events also have a substantive power to trigger hallucinations. For example, up to 80% of the recently bereaved report hallucinations of their loved one within the first month of the person's death (Grimby, 1993). Although predominantly visual in nature, these hallucinations can also have an auditory component. In youth, stressors such as bullying and sexual trauma are strong predictors of AH (Lardinois *et al.* 2011).

But even outside the context of trauma, psychological factors in general appear to play a pivotal role in prompting hallucinations. Hypervigilance, for example, and the way situations are appraised, act to shape and give credence to AH (Campbell & Morrison, 2007), with anxiety acting to reduce the threshold for accepting ambiguous signals as real. Everyday examples include mothers believing their babies to be crying, and physicians on duty hearing the phantom ring of their pagers. In general, all conditions which are accompanied by high expectancy for a perceptual signal are a fertile ground for hallucinations.

Even though it is sometimes possible to treat such psychosocially-induced hallucinations with antipsychotics, psychosocial interventions should be the treatment of first choice. Options could include case-management approaches, psychoeducation, improving coping mechanisms, cognitive therapies (Hayward *et al.* 2009; Deamer & Wilkinson, 2015), cognitive-behavioral therapy (CBT) (Thomas *et al.* 2014), trauma-related therapy (McCarthy-Jones & Longden, 2015; Steel, 2015), voice-dialoging (Corstens *et al.* 2012), mindfulness approaches (Strauss *et al.* 2015), and integrative treatments (Jenner *et al.* 2004).

In all, the above body of evidence converges with findings from the literature on schizophrenia, but also with the notion that there are many pathways independent of the dopamine system which are capable of eliciting hallucinations.

Are hallucinations a risk factor for later psychosis?

The question of whether isolated AH constitute a risk factor for developing a psychotic disorder, and therefore whether individuals with these experiences should receive early therapeutic interventions, cannot be answered conclusively. At this stage, however, the existing evidence suggests that the risk is low, unless AH are accompanied by other psychotic symptoms and/or functional deficits. Longitudinal follow-up studies of individuals who first experienced AH in childhood or early adolescence confirm this (Poulton *et al.* 2000).

While the prevalence of hallucinations in children is relatively high (i.e. 9%), these experiences are largely transient in nature (Jardri *et al.* 2014). A study of 337 children aged 7–8 years reporting hallucination-like experiences demonstrated that these experiences ceased spontaneously within 5 years in 76% of cases (Bartels-Velthuis *et al.* 2011). Rather than being associated with a later psychotic disorder, AH in children and adolescents are more frequently associated with a later depressive disorder, anxiety disorder or behavioral problems, even after adjusting for alcohol and illicit-substance abuse (Kelleher *et al.* 2012). Other studies concur, showing that the odds of AH alone to predict a psychotic disorder are low, unless they are accompanied by functional deficits or beliefs about malevolent intentions of the voices (Poulton *et al.* 2000; Daalman *et al.* 2016).

Other evidence comes from studies showing that the transition rate of young individuals with subclinical symptoms to psychosis varies widely. Psychotic symptoms that include hallucinations, delusional ideation and self-disturbances confer a relatively high risk for psychotic disorders in adulthood (Krabbendam *et al.* 2004), but less so when AH occur in isolation (Daalman *et al.* 2016). A number of variables appear to influence the transition to psychosis, including the persistence of symptoms over time, the onset of secondary delusions, depression, affective dysregulation and psychosocial dysfunction (Kaymaz & van Os, 2010). Conduct disorder, when co-occurring with AH, also predicts the transition to more severe forms of psychopathology (Askenazy *et al.* 2007).

Finally, studies of individuals in the prodromal phase (and in those with a diagnosis of schizophrenia spectrum disorder) show that no single symptom can predict the development of psychotic disorder or relapse into psychosis. More accurate predictions depend on features such as other psychotic manifestations, cognitive dysfunction, depression, and poor social functioning (Yung *et al.* 2003).

Conclusions

Altogether, AH and other hallucinations occur at relatively high rates in many different conditions and are

not pathognomonic for any given disorder (including schizophrenia) (Ford *et al.* 2014). AH can occur without other psychotic symptoms and may be caused by a range of conditions in which dopaminergic transmission is not compromised. In all cases, an accurate diagnosis is critically important, as persistent AH as part of a psychotic disorder may be a good indication for antipsychotic medication, whereas persistent AH in the absence of such a disorder are probably not. Although antipsychotic medication can be very effective and potentially life-saving in individuals with psychotic disorders, it is questionable whether it should be offered to all individuals with AH.

We believe the ambiguous use of the term ‘psychosis’ has caused much confusion in the minds of professionals and the lay public, and that the distinction between psychotic *symptom* and psychotic *disorder* is a particularly important one since psychotic symptoms can occur outside of a psychotic disorder. The habitual conceptualization of AH as a sure sign of schizophrenia spectrum disorder is a particularly good example of this problem, although a primary diagnosis of psychotic disorder is not justified for all individuals troubled by persistent hallucinations.

The roots of classification systems in conventional medical models require a diagnosis to rest on the presence and absence of several symptoms to determine whether the criteria for a specific syndrome or disorder may be fulfilled. In the traditional view of psychosis (as a state of distorted reality testing etcetera), the concomitant expression of at least one more psychotic symptom is critical. To that end, the DSM’s A-criterion for schizophrenia is very useful, since it demands the presence of at least two psychotic symptoms. In the sole presence of persistent hallucinations, we argue that the diagnostic criteria for Other Specified Schizophrenia Spectrum And Other Psychotic Disorder is not helpful.

Alternative locations for the listing of hallucinations in textbooks of psychiatry include other syndromes and disorders where the presence of other symptoms fulfil the criteria for these conditions (e.g. PTSD, borderline personality disorder, etc). Where other symptoms or the underlying cause cannot be clearly established or ascertained, a broader category akin to the ICD’s R44 (‘symptoms involving general sensations and perceptions’) may be helpful, perhaps under a new banner titled ‘Perceptual disorders’. This new domain could include a class of perceptual phenomena causing distress and dysfunction, but without any impaired reality testing (including tinnitus, Charles Bonnet Syndrome, phantom limb pain, pareidolia, and Alice in Wonderland syndrome, to mention a few examples). This may help to improve differential diagnosis, and in differentiating between

individuals who may benefit from antipsychotic medication and those who may not. Altogether, we should take note that the presence of persistent AH does not equate the presence of a psychotic disorder, and should therefore not uncritically be diagnosed or treated as such.

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