Original article

On the interconnectedness and prognostic value of visual and auditory hallucinations in first-episode psychosis

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A B S T R A C T

Background: Visual hallucinations (VH) are common symptoms in schizophrenia and other psychoses. An understanding of their cross-sectional and longitudinal patterns of association with auditory hallucinations (AH) is essential for developing accurate models of hallucinatory phenomena.
Objective: This study presents the most comprehensive examination of the association between VH and AH, and its change over time, in 1303 individuals with first-episode psychosis (FEP) and 469 individuals with chronic schizophrenia.
Method: The samples included data from the WHO multicentre study on the Determinants of Outcome of Severe Mental Disorders and the Western Australian Family Study of Schizophrenia (WAFSS). Standardized assessment of symptoms and functioning were used to examine the clinical profile and symptom co-occurrence of hallucinations over time.
Results: VH were approximately half as frequent as AH, almost always co-occurred with AH, and tended to be linked to a more severe psychopathological profile. AH and VH at baseline also predicted higher disability, risk of relapse and duration of psychosis after 1 and 2 years, especially when occurring in combination.
Conclusions: The findings point to three hallucination 'subtypes' with different symptom profile. The VH + AH combination signals greater psychopathology and a less favourable prognosis, than hallucinations occurring in isolation, and no hallucinations. This conclusion points to one common mechanism for all hallucinations, which can separate into distinct pathways and modalities. For a more complete clinical picture, clinicians should carefully probe for both auditory and VHs in presenting patients.

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1. Introduction

Hallucinations are common symptoms of schizophrenia and other psychoses and can cause significant distress and dysfunction. Since the earliest descriptions of schizophrenia, empirical research has focused primarily on auditory hallucinations (AH).

This is justified to some extent, given that AH are more prevalent in this disorder than any other condition [1]. AH however are not diagnostic of schizophrenia, and appear to have less prognostic value when compared to other symptomatology such as negative symptoms [2]. Too much focused attention therefore, on this single modality of hallucinations, may lead us to overlook the importance of other hallucination modalities.

Visual hallucinations (VH), for example, are often overlooked, and more commonly thought of as occurring in neurodegenerative and organic states. Their prevalence in schizophrenia has been estimated to be as high as 72% in some studies [3], with a weighted mean of 27% [4]. There has been a recent surge of interest in these symptoms [5–7], although many questions remain regarding how

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they relate to AH, their demographic and clinical profile, and prognostic value.

One issue which requires closer examination is the co-occurrence of AH and VH [8]. Early studies suggested that VH often accompany AH [3,9] pointing to common, amodal mechanisms between hallucination modalities. Such evidence might increase knowledge about the separability of, and overlap between, hallucinations, and support the development of appropriate interventions. Few studies have been conducted using large cohorts, and fewer still have examined whether these relationships are maintained over time within the same individuals. Also required, is information regarding the temporal association between AH and VH and the prognostic significance of VH relative to AH.

The current study sought to develop a deeper understanding of VH in psychosis in two separate cohorts: An international cohort with first-episode psychosis (FEP) [10], which had been followed up longitudinally after 1-year and 2-years, and an Australian cohort of chronic individuals with sustained schizophrenia-spectrum disorders [11]. Using data from these FEP and chronic participants, we examined:

- the frequency, and demographic and clinical characteristics of VH and AH;
- symptom co-occurrence between hallucination modalities;
- whether AH-VH relationships are maintained over time within the same individuals;
- whether the presence of VH is associated with poorer functioning at early stages of the disorder, and after one and two years.

With a clearer picture of VH, greater insights regarding hallucinations may be gained, with important theoretical and treatment implications.

2. Method

2.1. WHO cohort

One cohort comprised 1303 FEP participants aged 15–54 years who were recruited as part of the World Health Organisation (WHO) collaborative 12-country study. The methods have been comprehensively described in previous publications [10,12–14]. Symptoms in the past month were captured with the Present State Examination (PSE) Version 9 [15]. Diagnostic classification according to ICD-9 symptoms (Supplementary material) [13]. The Disability Assessment Schedule (DAS) [10] assessed functioning in five domains with 97 items.

WHO patients were reassessed at 1 and 2 years. Of the initial cohort 75.6% were re-examined using the PSE and other follow-up history schedules including the Diagnostic and Prognostic Schedule (DPS) [13] which was used to produce a clinical summary [16]. Number of months in a psychotic episode in the past 12 months was used to examine the course and outcome of patients over time.

2.2. WAFSS cohort

The second cohort comprised 469 chronic participants who took part in the Western Australian Family Study of Schizophrenia (WAFSS) [11,17,18] and met ICD-10 criteria for a lifetime diagnosis of schizophrenia-spectrum disorder. The Diagnostic Interview for Psychosis (DIP) [19] provided a diagnostic output comparable to the PSE (Supplementary material). Any participants with uncertain scores after review were removed from the final dataset, resulting in no missing data. Daily functioning was assessed using the Global Assessment of Functioning (GAF) [20].

Both WHO and WAFSS obtained ethical approval to conduct the studies at all sites [11,13].

2.3. Statistical analyses

Data were analysed using SPSS Versions 19 and 21 [21,22]:

- in stage one of the analysis, demographic and clinical characteristics were contrasted using ANOVA for continuous variables, and chi-square for frequency data. Classification was as follows: AH (AH only), VH (VH with or without other hallucinations), OH ('other' low frequency hallucinations; olfactory, gustatory, tactile, and sexual), and NH (no lifetime history of hallucinations);
- stage two of the analysis reviewed patterns of symptom co-occurrence where Odds Ratios (OR) were used to examine associations between hallucination modalities;
- in stage three a longitudinal examination in the FEP dataset determined whether hallucinations at intake were linked to hallucinations presence at time 1 and 2 with a linear (least square) regression;
- in stage four, we examined symptom correlates at the first assessment, and whether hallucinations at intake were associated with poor functioning at follow-up 1 and follow-up 2 in the FEP group.

Functioning was assessed with DAS Global scores, relapse (0/1), and months in psychotic episode in previous 12 months. Group comparison on DAS scores and months in psychotic episodes were conducted with MANOVA. DAS scores at intake and gender were entered as covariates. For relapse at follow-ups 1 and 2, Chi-square tests were conducted. Statistical significance was set at .05.

3. Results

At intake, the mean age of FEP participants (WHO dataset) was 27.1 years (SD = 11.4), and comprised 626 males (48.0%). The mean age of the WAFSS participants was 36.5 years (SD = 10.5), and comprised 345 males (73.5%).

3.1. Analyses stage 1 – frequencies, demographics and clinical characteristics

Table 1 shows that hallucinations frequencies were higher in the WAFSS participants (88.5%) than in the FEP cohort (65.3%). The distribution of the different hallucination modalities was similar across datasets, with AH as the most prevalent (79.3% and 58.0% in the WAFSS and FEP cohorts respectively), followed by VH (37.7 and 28.0%), and lastly, other modalities (olfactory, 15.1% vs 11.3%; tactile/gustatory, 16.8% vs 12.1%). Sexual hallucinations were only assessed in WAFSS participants, and had a frequency rate of 4%. Verbal hallucinations were more common than non-verbal hallucinations in both cohorts, and complex-type VH were more common than simple-type VH (16.7% vs 11.3%, FEP cohort).

Variations in prevalence rates between WHO research centres, $X^2(10) = 125.35$, $P < 0.001$ supported early findings [13]. VH tended to be more common in developing (Nigeria, India and Colombia) than industrialised countries ($X^2 = 22.6$, $P < 0.001$; Supplementary material).

Characteristics of VH and AH are presented in Table 2. The gender distribution tended to differ between groups with more females in the VH relative to the AH and NH groups (FEP: 49.4, 40.4 and 28.1% respectively; WAFSS: 29.9, 24.1 and 16.7%