Identifying the cognitive underpinnings of voice-hearing by comparing never, past and current voice-hearers

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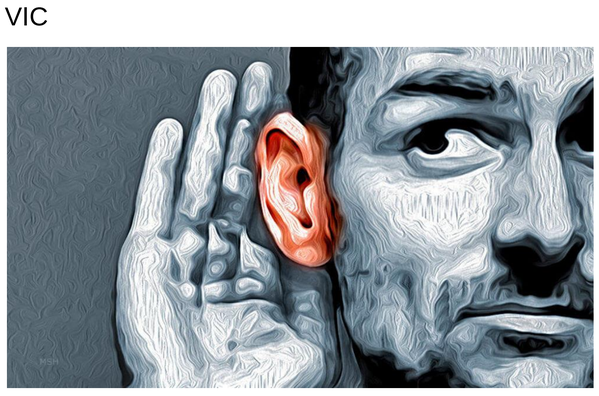
Background

Auditory verbal hallucinations (AVHs) refer to the perception of verbal utterances in the absence of corresponding external stimuli, and are a hallmark feature of psychosis. In addition, psychotic illnesses are often accompanied by broad cognitive dysfunction affecting most domains. Yet to date, there has been scant research examining cognitive profiles specific to voice-hearing symptoms.



Aims

The current study aimed to: i) evaluate comparative cognitive profiles of individuals with schizophrenia spectrum disorders (SSDs) based on AVH status (i.e. current, past or never), and ii) explore which cognitive variables significantly predicted the presence (versus absence) of AVHs.

Method

Clinical participants were partitioned into: i) *Current* voice-hearers (*n*=46), ii) *Past* voice-hearers (*n*=37), and iii) *Never* voice-hearers (*n*=40), and compared with 319 non-clinical controls (NCs). This was achieved using a forced-choice question: "Sometimes people say that they can hear noises or voices inside their head that others can't hear. Have you ever experienced this?" (nb. current voice-hearers were designated as having experienced an AVH episode within the last 14 days). Cognitive assessment employed the MATRICS Consensus Cognitive Battery (MCCB), supplemented by the Delis-Kaplan Executive Function System (DKEFS) Colour-Word Interference Test (Stroop) as a robust measure of executive function. Normative *z*-scores were calculated using our own NC performance as baseline.

Results

Demographic

- All groups were well-matched on age and sex
- Premorbid IQ: Current=Past=Never<NCs

Clinical

- Clinical groups were well-matched on illness duration and psychosis severity
- Depressive symptoms: Current=Past>Never>NCs
- Mania symptoms: Current=Past=Never>NCs

Cognitive (see Figure 1)

- Visual learning^: Past=Current<Never<NCs
- Social cognition*: Never=Current<NCs
- Inhibition#: Current<NCs
- Other cognitive domains: Current=Past=Never<NCs

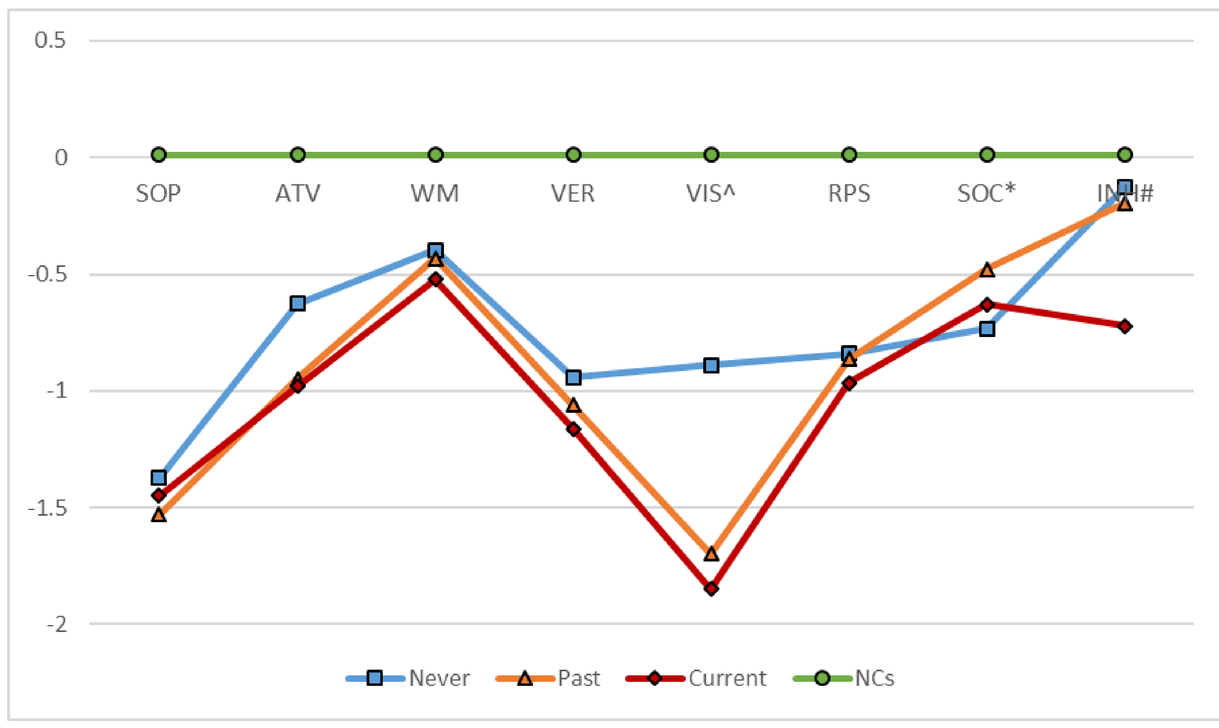


Figure 1. Group performance across cognitive domains (standardised with respect to non-clinical control performance in green). SOP=Speed of Processing; ATV=Attention/ Vigilance; WM=Working Memory; VER=Verbal Learning; VIS=Visual Learning; RPS=Reasoning & Problem-Solving; SOC=Social Cognition; INH=Inhibition.

Visual learning, *Social cognition* and *Inhibition* were entered into a binary logistic regression to identify which cognitive variables were a significant predictor of AVHs (nb. current and past voice-hearers were combined into a single group; *n*=83; see Table 1). The overall model was significant, $\chi^2(3)=10.0$, $p=.019$, explaining between 9.7% (Cox & Snell) and 13.6% (Nagelkerke) of variance, and accurately predicted AVH presence 68.4% of the time. However, only *Visual Learning* was a significant cognitive predictor of AVH presence.

Table 1
Binary logistic regression examining cognitive predictors of AVHs in clinical groups only

Cognitive predictor	B	Wald	p	Odds ratio	95% CI
Visual learning	.478	7.36	**.007**	1.61	1.14-2.28
Social cognition	.309	2.04	.154	1.36	.89-2.08
Inhibition (i.e. Stroop)	.023	.014	.904	1.02	.70-1.48

Discussion

Visual learning, and possibly inhibition, may be the two key cognitive domains distinguishing whether SSD patients experience AVHs, and could serve as viable therapeutic targets for treatment. Future research should focus on investigating additional cognitive mechanisms, employing diverse voice-hearing populations, and embarking on related longitudinal studies.

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