

# Risk of Suicidal Behavior Among Young Patients with Visual Hallucinations, Comparing Auditory Verbal Hallucinations

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## Introduction

Visual hallucinations (VHs) and auditory verbal hallucinations (AVHs) are two of the common symptoms in child psychiatry. Recent studies suggest that psychotic experiences, especially AVHs, may strongly associate with poor mental health state, for instance, depressive state, and suicide related behaviors. On the other hand, there is no evidence of relationship between VHs and suicide related events. We conducted this study to clarify the relationship between VHs and suicide related symptoms among patients with depressive mood.

## Methods

**Study type;** A cross sectional study  
**Sample;** 1293 first-visit psychiatric referrals aged 10–15 years at child and adolescent psychiatric care in Yokohama City University Hospital(YCUH), Yokohama City University Medical Center(YCUMC), and Kanagawa Children's Medical Center(KCMC) in Japan from April 2016 to March 2018.  
**Exclusion criteria;** patients with no diagnosis, with mental retardation, and patients who didn't complete questionnaires.  
**Measures;** Self reported questionnaires were performed upon their first-visit. Depression was assessed with the nine-item Patient Health Questionnaires (PHQ-9), which include a question on suicidal ideation (item 9). PHQ-9  $\geq 15$  is defined as severe depression,  $<15$  is defined as mild depression. Questions on AVHs, VHs and suicide related events (self-harm, suicide planning, suicide attempt) were also asked. This study was approved by the ethics committees of YCUH, YCUMC, and KCMC.

## Questionnaires

Over the last 2 weeks, have you ever;  
- thought that you would be better off dead, or thought of hurting yourself? (**Suicidal ideations, item 9 of PHQ-9**)  
0: not at all, 1: on several days, 2: more than half days, 3: nearly every day  
2 and 3 are defined as positive

Over the last 2 weeks, have you ever (Yes/No);  
- intentionally hurt your body? (**Deliberate self-harm behavior**)  
- planned suicide? (**Suicide planning**)  
- attempted suicide? (**Suicide attempt**)  
- heard voices that no one else can hear? (**AVHs**)  
- seen a person or animals or ghosts and so on that no one else can see? (**VHs**)

## Statistical analysis

Logistic regression was performed to estimate the association between suicidal ideations, self-harm behavior, suicide planning, suicide attempt between AVHs, VHs, and symptoms of depression other than suicidal ideation (item 1-8 of PHQ-9). The explanatory variables and covariates (gender, age, diagnosis of psychotic disorder, or mood disorder) were simultaneously entered into the model. Interactions between the variables were tested and when the P value was less than 0.1, forward step wise selection was done.

## Results

Figure 1  
Prevalence of VHs and AVHs In total

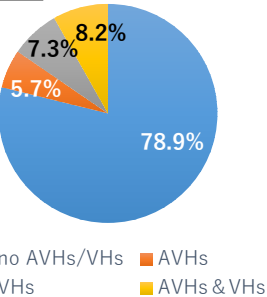
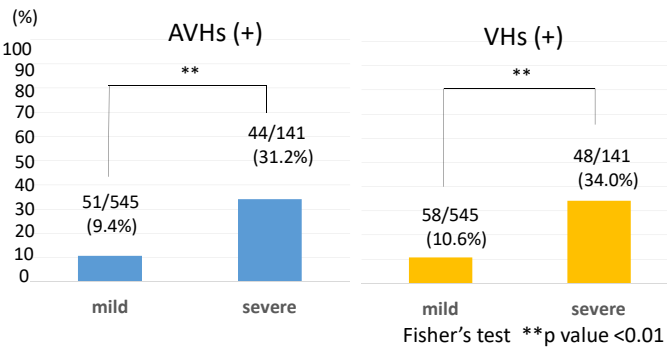


Table 1  
Prevalence of AVHs and VHs in each group

	AVHs n (%)	VHs n (%)
Total N=686	95 (13.8)	106 (15.5)
Male N=356	43 (12.1)	47 (13.2)
Female N=330	52 (15.8)	59 (17.9)
10-11y.o.N=204	31 (15.2)	31 (15.2)
12-13y.o.N=265	34 (12.8)	41 (15.5)
14-15y.o.N=217	30 (13.8)	34 (15.7)
Psychotic disorder N=20	10 (50.0)	12 (60.0)
Mood disorder N=58	8 (13.8)	8 (13.8)

Figure 2  
Prevalence of VHs and AVHs among mild and severe depression



## Summary of findings

- 1) The VHs experience was recognized at 15.5%, while the AVHs was 13.8% in clinical cases. (Figure 1)
- 2) VHs and AVHs were more prevalent among patients with severe depression. (Figure 2)
- 3) VHs were significantly associated with all suicidal behaviors, while AVHs were associated with only the suicide attempt. (Table 2)

## Clinical implication

Visual hallucinations is a symptom that clinicians should pay attention to as well as auditory verbal hallucinations and depression.

## Discussion

- Previous study has shown that 14% of youth in general population experienced VHs, while 5.6% experienced AVHs. (M.Cederlof et al. 2017) Our study revealed that VHs are also common in youth with mental health problems.
- "VHs specific mental illnesses" in youth is not common, thus there are only a few studies which illustrate the relationship between VHs and depression or suicide related symptoms.
- In prior research, the VHs are associated with suicidal ideation in young people (N. Grano et al. 2015). Our study suggests that VHs affects not only the ideation but also all suicide related symptoms including suicide attempt.
- This was the first study to investigate relations between VHs and all suicidal behaviors among young patients with depression.

Table 2  
The association between suicidal behaviors and VHs, AVHs, or depressive symptoms

	suicidal ideations (PHQ-9, item 9)	self-harm behavior	suicide planning	suicide attempt
	AOR(95% CI)	AOR(95% CI)	AOR(95% CI)	AOR(95% CI)
Auditory verbal hallucinations(AVHs)	0.91(0.44-1.87)	1.36(0.74-2.50)	1.64(0.85-3.18)	2.74(1.09-6.91)*
Visual hallucinations(VHs)	2.81(1.42-5.57)**	1.78(0.99-3.19)*	2.15(1.13-4.13)*	2.88(1.14-7.26)*
PHQ-9				
Item1 (decline of motivation)				
Item2 (depressed mood)	2.58(1.91-3.47)**		1.91(1.38-2.63)**	2.19(1.41-3.42)**
Item3 (sleeping disorder)				
Item4 (easily feeling tired)				
Item5 (abnormal appetite)				1.68(1.19-2.38)**
Item6 (feelings of guilt)	2.39(1.84-3.09)**	1.76(1.44-2.16)**	1.49(1.15-1.95)**	
Item7 (difficulty concentrating)	1.45(1.11-1.89)**	1.48(1.18-1.85)**		
Item8 (slow motion or impatience)				

AOR; Adjusted odds ratio. 95% CI; 95% confidence interval, P; p value, \*P<0.05 \*\*P<0.01  
Adjusted for gender, age, and diagnosis( psychotic disorder, mood disorder)

## Limitation

As this research is based on questionnaires, the relationship between the content of the VHs and suicide behavior did not become clear. We have not examined the relationships with traumatic symptoms, presence of abuse, substance use abuse, organic mental disorder. It is a subject of future research.

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Conflict of interest(COI); No potential COI to disclose