

## Relationship between Trauma-related Psychotic Reactions and Post-Traumatic Stress Symptoms: The Mediating Role of Alcohol Use

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### ABSTRACT

This study examined the mediating role of alcohol use in the relationship between PTSD symptoms and psychotic reactions. 231 participants including 181 females were recruited via web advertisement and flyers. Alcohol use status, psychotic experience (indicated by hallucination and paranoia specifically), and PTSD symptoms were measured by Feeling the need to Cut down, Annoyed by criticism, Guilty about drinking, and need for an Eye-opener in the morning (CAGE), Psychosis Screening Questionnaire (PSU), and Short screening scale for posttraumatic stress disorder (SSSP). All the participants were asked to fill in the questionnaires on the Internet and were interviewed later to validate the screening. Logistic regression was used to estimate the mediating effect of alcohol use. Results showed that alcohol use played a mediating role between PTSD symptoms and auditory hallucination while this effect didn't exist between PTSD symptoms and paranoia. Findings implicated that hallucination experience related with post-traumatic experience was affected by alcohol use while paranoia was not.

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## Introduction :

Post-Traumatic Stress Disorder (PTSD) is characterized by re-experiencing symptoms related to the trauma, as well as emotional numbing, avoidance of trauma-related stimuli, and increased arousal[1]. Among nationally representative studies of adult household residents, life-time prevalence ranges from 1.7% in South Korea to 8.8% in Northern Ireland[2, 3].

Devastating consequence can be brought by PTSD. Mounting evidence showed that trauma and PTSD symptoms can be risk factors in the emergence of psychotic experiences [4–8]. In a sample of 38 clients in treatment for recent onset of psychosis, 66% of the clients reported intense distress related to psychotic symptoms meeting symptom criteria for the PTSD syndrome and 39% meeting full diagnostic criteria for PTSD[9]. Vogel et al. (2006) found that posttraumatic symptomatology rather than trauma itself increased the risk of psychopathological experience in the schizophrenia inpatients. Nevertheless, the relationship still hasn't been fully understood besides the theory that PTSD and psychosis are both part of a spectrum of reactions to trauma [9–11].

Prior research indicates that alcohol use associated with both PTSD symptoms and psychotic experiences. High rates of problematic alcohol use have been found co-occur frequently with trauma and PTSD in diverse samples[12–14]. From the perspective of self-medication hypothesis, consuming alcohol in PTSD patients is an attempt to cope with their PTSD symptoms and finally leading to alcohol abuse or dependence [15, 16].

Meanwhile, alcohol use is also one of the vulnerabilities for individuals to have psychotic experience. Rates of alcohol use are significantly higher in the psychosis group than that in the general population [17]. Patients with psychotic symptoms are more likely to suffer from alcohol use problems than those without psychotic symptoms [18]. Heavy alcohol use was significantly related to paranoia, disorganized incoherent speech, and suicidal behavior[19], which also obtained support in general population [20, 21].

To sum up, due to the shared link of PTSD and psychosis with alcohol use, we hypothesize that alcohol use as a putative mediator in between to cope with

trauma and distress while end up with psychotic experience especially the positive symptoms [5, 6]. The current study intends to examine the mediating role of alcohol use in the two types of symptoms in a Chinese sample suffering from traumatic events. It was predicted in this study that alcohol use mediated the associations between PTSD symptoms and psychotic experiences. Specifically, it was proposed that the individuals with elevated PTSD symptoms were more tentative to consume alcohol therefore experience more psychotic experiences.

## Method :

### *Participants*

The current study was approved by an institutional review board in the author's institution. 231 participants seeking help for traumatic experiences after seeing our advertisements posted on the social network were recruited on the Internet to fill out a series of questionnaires. All the participants were interviewed by professional psychologists in our research group via video or phone call to be screened for the subsequent internet-based PTSD intervention. Of them, 181 participants were female. All the participants were Han Chinese. In consideration of the ethical standards, the participants involved in the research got access to the free psychological intervention delivered by professional psychologists via the internet.

### *Measures*

**Short screening scale for posttraumatic stress disorder (SSSP)** The SSSP [22] is a 7-item self-report questionnaire assessing a range of post-traumatic stress disorder symptom in both clinical and non-clinical samples. Participants are required to answer whether he/she is experiencing the symptoms (0 means "NO" and 1 means "YES"). The SSSP has demonstrated appropriate inner consistency validity (Cronbach alpha = 0.76) and test-retest reliability of  $r = 0.78$  for a 3-week test-retest.

The first step of the current study is to validate SSSP in Chinese sample with the background that there is no available PTSD screening scale in China. We used the standardized procedures for the cross-lingual adaptation of measures for the translation[23]. Specifically, we first translated the English SSSP items

into Mandarin by a native speaker, then we have a bilingual team of researchers and clinicians to examine the translated version for clarity. Finally, we back-translated the SSSP into English and compared with the original instrument, with only a few additional clarified changes necessary.

71 normal university students (non-trauma controls) and 70 participants with traumatic exposure (trauma-exposed) were involved in the research. The students were recruited from the school of psychology at Beijing Normal University and each student participated would get one additional credit. The trauma-exposed group were recruited from the community in Sichuan Province in China survived the earthquake. They were interviewed by our colleagues who delivered psychological service during the earthquake. Both the groups were asked to fill out the SSSP, Post-traumatic Diagnostic Scale (PDS) [24] and Symptom Checklist 90-Depression (SCL-D) [25]. Cronbach alphas were deemed to be acceptable in two groups (university students  $\alpha = 0.68$ , traumatic group  $\alpha = 0.65$ ). To assess concurrent validity, correlations between SSSP and PDS were calculated. In the non-trauma controls group, the correlation between SSSP and PDS was 0.62; in the trauma-exposed group, the correlations were 0.68. To assess the criterion validity, the scores on SSSP between the two groups were compared. The trauma-exposed group scored higher on SSSP than the control group significantly (4.57, **SD** = 1.87 vs. 2.76, **SD** = 1.98),  $t(139) = -5.58$ ,  $p < .001$ , which implied that the criterion validity of SSSP was appropriate.

In conclusion, the Chinese version of SSSP is acceptable on its reliability and validity to assess PTSD symptoms (data of SSSP revision is unpublished). In the current study, the alpha of SSSP is 0.70.

**Feeling the need to Cut down, Annoyed by criticism, Guilty about drinking, and need for an Eye-opener in the morning (CAGE)** [26]. CAGE is a self-report scale assessing alcohol use problems. The scale consists of 4 items (e.g. "Have you ever felt the need to cut down your drinking?"). Participants were asked to evaluate whether they are suffering the problems (0 for "NO" and 1 for "YES"). More than one (include one) "YES" in the answers will be regarded as alcohol use problems and more positive answers suggest increased severity of problematic drinking. The Chinese

version of CAGE has better validity in an overall accuracy of 0.77 in the ROC curve analysis [27]. In the current study, the internal consistency coefficient of CAGE is 0.76.

**Psychosis Screening Questionnaire (PSQ)** The PSQ [28] was used to assess the possible psychotic reactions in individuals. The questionnaire is established based on the Mental and Behavioral Disorders in World Health Organization (WHO) International Classification of Disease (ICD-10). The 5 items include two types of symptoms: schizophrenia and affective psychosis asking about respondents' experiences over the last year. In the current study, two items related to trauma-induced psychotic reactions (i.e. the experiences of paranoia and auditory hallucinations) were used [29]:

PSQ3B: Felt a group of people was plotting to cause you serious harm.

PSQ5A: Heard voice saying quite a few words or sentences.

Each item required a dichotomous response of 'yes' or 'no', the answer 'yes' indicating a positive screen for paranoia or auditory hallucinations, respectively.

#### *Data analysis*

We calculated descriptive statistics for all variables. Spearman correlations were used to evaluate the association between PTSD symptoms, auditory hallucination, paranoia and alcohol use problems. Firstly, the associations between PTSD symptoms, and auditory hallucinations, paranoia were examined using multiple logistic regression analyses with demographic factors being controlled. Demographic factors including gender, socioeconomic status, education level, were calculated as covariates. Then alcohol use status was included. Logistic regression analyses were used to estimate the mediation role of alcohol use in the relationship between PTSD symptoms and auditory hallucination, paranoia separately.

#### **Results :**

##### *Descriptive characteristics and Correlations*

Characteristics of the sample and the categories of trauma events are presented in Table 1. 181(78%) participants were women. The mean CAGE score was

0.71 ( $SD = 0.97$ ). The mean SSSP score was 4.16 ( $SD = 2.01$ ).

Table 2 shows the means, standard deviations, and correlations for PTSD symptoms, alcohol use, auditory hallucination and paranoia. PTSD symptoms were positively correlated with alcohol use and psychotic experiences. Alcohol use was positively correlated with psychotic experiences. Independent t-test compared the difference between females and males on the alcohol use problems, PTSD symptoms, and trauma related psychotic experience. A sex difference occurred on the CAGE score ( $t(64.50) = -2.072, p = 0.042$ ) with men scoring significantly higher than women. There was no significant sex difference for SSSP scores ( $t(229) = -0.85, p = 0.394$ ).

*Mediating effects of alcohol use*

The procedures of Baron and Kenny [25] were followed to evaluate whether alcohol use mediated the effect of PTSD symptoms on auditory hallucination. PTSD symptoms significantly related to auditory hallucination ( $\beta = 0.231, SE = 0.083, p = .005$ ) and there was a statistically significant effect of PTSD symptoms on alcohol use ( $\beta = 0.175, SE = 0.030, p < .001$ ). The effect of the mediator alcohol use on the logit of auditory hallucination was statistically significant ( $\beta = 0.318, SE = 0.160, p = .047 < .05$ ) even when controlling for the PTSD symptoms. This same analysis was undertaken with paranoia as the outcome variable. PTSD symptoms significantly related to paranoia ( $\beta = 0.279, SE = 0.079, p < .001$ ) and there was a statistically significant effect of PTSD symptoms on alcohol use as calculated above. The effect of the mediator alcohol use on the logit of paranoia was not significant ( $\beta = 0.106, SE = 0.153, p = .487 > 0.05$ ) anymore after controlling for the PTSD symptoms.

**Discussion :**

This study focused on the mediating role of alcohol use in the association of PTSD symptoms and psychotic experience in a Chinese sample who exposed in trauma. The results showed that PTSD symptoms measured with SSSP related to auditory hallucination and paranoia significantly, which was in accordance with prior research which indicates more severe PTSD symptoms were associated with a higher possibility to experience hallucination and paranoia [5, 31]. Results showed that auditory hallucination and paranoia were two kinds of

**Table 1. Demographics of Participants**

	Number (%)		Number (%)
<b>Age, years</b>		<b>Education</b>	
18~25	10 (4.3)	Middle School	2 (0.1)
26~40	119 (51.7)	High School	25 (10.8)
41~55	82 (35.5)	Diploma	34 (14.8)
≥56	20 (8.6)	Bachelor	124 (53.7)
		Master	46 (20.3)
<b>Marital status</b>			
Single	183 (79.6)	Married	48 (20.7)
<b>Trauma events *</b>			
Traffic Accidents	33	Physical injury	95
Sexual assault	42	Natural Disaster	29
Fire accident	13	Accidents during work	32
War	1	Witness of Death	24
Death of some-one close	79	Harm to others	12

\* Most of the participants have more than one trauma

**Table 2. Correlations between PTSD symptoms, alcohol use problems, and trauma-related psychotic reactions**

Variable	1	2	3	4
<b>1.SSSP (PTSD symptoms)</b>	1			
<b>2.CAGE (Alcohol use)</b>	0.363**	1		
<b>3.PSQ-5A (Hallucination)</b>	0.186**	0.197**	1	
<b>4.PSQ-3B (Paranoia)</b>	0.239**	0.132*	0.223**	1
<b>M</b>	4.16	0.71	0.25	0.32
<b>SD</b>	2.01	0.96	0.43	0.47

\*\* $p < .001$ ; \* $p < .05$ ;

Note. SSSP: total score of Short screening scale for post traumatic stress disorder; CAGE: total score of Feeling the need to Cut down, Annoyed by criticism, Guilty about drinking, and need for an Eye-opener in the morning; PSQ-5A: the score of fifth item of the Psychosis Screening Questionnaire; PSQ-3B: the score of third item of the Psychosis Screening Questionnaire.

psychotic experience associated with alcohol use. Psychotic experience might be an outcome of consuming alcohol which supported previous research on the effect brought by alcohol use [20]

The current study tried to investigate the mechanism of psychotic reactions. Alcohol use played a role of mediator in the relationship between PTSD symptoms and auditory hallucination which in accordance with the self-medication model [16]. Individuals who suffer from PTSD symptoms try to cope with the distress using alcohol leading to the high possibility of hallucination. The results have shown that alcohol may worsen the experience of auditory hallucination in people with PTSD symptoms. This effect may be due to the effect of alcohol acting on human's nervous system [32]. However, alcohol use was not testified as a mediator between PTSD symptoms and paranoia. PTSD symptoms directly affected the possibility of paranoia experience even taking alcohol use into consideration.

This result was in line with the study which showed that hallucination and paranoia may be based on a different mechanism which affected by the emotional process [33]. Paranoia may be a direct representation of emotional concerns and that emotion contributes to paranoia formation and maintenance. While for the hallucination, emotion can be a trigger and less often directly affect the emergence of hallucination. That could be an explanation of outcome in our study that consuming alcohol may accelerate the incidence of auditory hallucination while not the paranoia in the individuals with PTSD symptoms.

The current study may have some implications on the practice. People with PTSD symptoms may suffer from the trauma-related psychotic experience. Alcohol use played different roles in this process. For the paranoia, PTSD symptoms may become the focus of intervention while for the hallucination, clinicians need pay attention on the alcohol use problem or other problematic substances consumption to alleviate psychological distress. This is consistent with the strategy for PTSD symptom in practice which alcohol use problems should be under control in the first place [34, 35].

There are some limitations in the current study. First, there were more women than men in our sample and this may have skewed the results. Second, the lack of longitudinal data does not allow causal interpretation. Third, the participants in the current study all had great intention to seek help while we may not include the

potential help seekers in our study. That may also cause some bias in the sample distribution. Lastly, the measure we used to evaluate the hallucination and paranoia were dichotomous items which may weaken the results and cannot generate the conclusion into the psychosis sample. Future studies should investigate the relationship between PTSD and trauma-related psychotic reactions in the large sample and adopt the tracking design to broaden into a complete perspective on the influence of alcohol use.

#### Conclusion

Alcohol use acted as a mediator between posttraumatic symptoms and psychotic experiences and the current study consolidated the self-medication theory to provide a possible explanation of the frequently presented psychotic experience in the sample with traumatic experience.

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