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Differences in the internal structure of hallucinatory experiences between clinical and nonclinical populations

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ABSTRACT

We investigated differential patterns of hallucinatory experiences between nonclinical and clinical samples. A total of 223 nonclinical individuals (108 females) and 111 subjects with schizophrenia (54 females) completed the Launay–Slade Hallucination Scale-Revised (LSHS-R) and Perceptual Aberration Scale (PAS). The Minnesota Multiphasic Personality Inventory-2 (MMPI-2) was used for the nonclinical group, and the Positive and Negative Syndrome Scale (PANSS) hallucination item was used for the clinical group. Cronbach's alpha values showed good internal consistency for the LSHS-R. In the two groups, significant associations were found between LSHS-R and PAS scores. Two factors were extracted through a principal component analysis (PCA) in the nonclinical group, and three factors were identified in the clinical group. The results of a hierarchical cluster analysis (HCA) revealed that a perception–cognition dimension was clear cluster discriminating element for the nonclinical group, whereas alterations in perception–cognition dimension were characteristic in cluster structure of the clinical group. Our findings suggest that the nature of hallucinatory experiences may differ qualitatively between a nonclinical population and subjects with schizophrenia. Perceptual or cognitive aberrations may add a psychopathologic dimension to hallucinatory experiences. Exploring the internal structure of hallucinatory experiences may provide explanatory insight into these experiences in the general population.

1. Introduction

There is currently a great deal of interest in the clinical significance of hallucinations, not only in psychiatric disorders but also in persons without psychopathological disorders (Johns and van Os, 2001; Kot and Serper, 2002; Verdoux and van Os, 2002; Serper et al., 2005). The results of community-based studies have demonstrated that hallucinatory experiences can occur in the general population (Larøi et al., 2012; Johns et al., 2014), and a recent meta-analysis showed that the median 1-year incidence of psychotic experiences in the general population is 3.1% (van Os et al., 2009). In contrast, subthreshold psychotic symptoms may lead to an increased risk of psychotic disorders in the general population (Poulton et al., 2000; Welham et al., 2009) and in treatment-seeking populations (Cannon et al., 2008). However, it remains disputed whether aberrant experiences (i.e., hallucinations or delusions) in community samples are variations of the 'psychoticism' dimension of personality (fully dimensional) or phenotypic expressions of schizotypal features, such as attenuated psychotic symptoms (quasi-dimensional) (Meehl, 1989; Kim, 2004). Given the phenotypic diversity of psychotic-like experiences in the general population, whether or not psychotic-like experiences reach levels of clinical psychosis may depend on multidimensional determinants of the symptom structure, including psychosocial distress, preoccupation, and conviction, rather than the contents of the experiences (Jung et al., 2008). This hypothesis has been supported by previous studies of religious and psychotic populations (Peters et al., 1999; Murray et al., 2012).

Although the inconsistent prevalence rates of hallucinatory experiences across studies and samples may be attributable to diverse definitions and methods, these inconsistencies may also reflect inherent characteristics based on gender, culture, and context

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(Larøi et al., 2014). In comparison to a 4% endorsement rate for hallucination questionnaires in a Caucasian sample, the rate was 2.5 times higher in a Caribbean sample, suggesting inter-ethnic or trans-cultural issues in assessing hallucinatory experiences (Johns et al., 2002). There is a very wide range in the estimates of cross-national prevalence of hallucinations in the general population, with several countries with an extremely high percentage of subjects reporting hallucinations (e.g., 32.0% in Nepal) (Nuevo et al., 2012). Previous studies suggest the importance of cultural factors in understanding how members of particular societies respond to people who report hallucination-like experiences (Larøi et al., 2014). For example, the tradition of Korean shamanism, also known as Muism, considers the hallucinatory experiences as providing guidance or predicting future (Kim and Chang, 1998). The prophetical role of hallucinatory experiences is commonly found in Korean folk tales. On the other hand, young Koreans are familiar with Western culture and uncomfortable in sharing hallucination-like experiences. Many self-report items related to hallucinatory experiences are often influenced by cultural factors that affect the validity and reliability of the endorsement rate (National Institutes of Health, 1998). Therefore, the use of common standardized assessment tools is necessary to objectively assess hallucinatory experiences in the general population (Beavan et al., 2011; Vellante et al., 2012).

The Launay–Slade Hallucination Scale (LSHS) is one of the most widely used tools for the assessment of hallucinatory predisposition (Launay and Slade, 1981). It was revised (LSHS-R) by Bentall and Slade (1985) and has been validated for measuring hallucinatory vulnerability in both nonclinical (Levine et al., 2004) and clinical populations (Kot and Serper, 2002). Many studies have explored the psychometric and structural properties of the LSHS-R (Cella et al., 2008; Paulik et al., 2008). The results of factor analyses have shown that the LSHS is multifactorial and that the number of factors varies from two to four (Larøi et al., 2004; Serper et al., 2005). A two-factor solution included auditory and visual hallucinations based on sensory modality (Morrison et al., 2000) whereas a three-factor solution revealed 'tendency towards hallucinatory experiences', 'subjective externality of thought', and ' vivid daydreams' (Aleman et al., 2001). Finally, a four-factor solution included 'vivid daydreams', 'clinical auditory hallucinations', 'intrusive thoughts', and 'sub-clinical auditory hallucinations' (Levitan et al., 1996). These findings suggest that the internal structure of the LSHS-R may reflect the complex interactions between perception and cognition, and assess some essential features of hallucination, formal thought disorder, and cognitive alterations.

In characterizing hallucinatory experiences, comparisons between nonclinical and clinical samples can identify both similarities and differences (Larøi, 2012). In this study, we examined the psychometric properties of the Korean version of the LSHS-R and explored the differential patterns of hallucinatory experiences between nonclinical and clinical Korean samples. Based on the inherent characteristics of the LSHS-R, we hypothesized that subjects with clinical psychosis would exhibit altered interactions between perception and cognition, indicating leading to psychosocial distress and maladaptation.

2. Methods

2.1. Participants

Our study sample consisted of 223 community members (115 males and 108 females) and 111 subjects with schizophrenia (57 males and 54 females). The nonclinical sample was recruited from community residents. Individuals with a professional background in mental health were excluded. The inclusion criteria for the nonclinical group were 1) male or female aged 18 through 65 years, 2) Korean ethnicity, 3) fluency in written and spoken Korean, 4) no history of any psychiatric disorder, 5) no first-degree relative with a history of a psychiatric diagnosis or treatment, and 6) no neurological conditions associated with hallucinations. As for the clinical group, subjects who reported active auditory verbal hallucinations (AVHs) were recruited in collaboration with co-investigators who worked in Seoul and Gyeonggi area of Korea, namely at the Seoul National University Hospital and Boramae Medical Center, Seoul, Republic of Korea. Active AVHs were operationally defined as including both the experience of hearing 'voices' and a minimum score of three on the hallucination item (P3) of the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987). The inclusion criteria for the patient group were 1) DSM-IV diagnosis of schizophrenia (American Psychiatric Association, 2000), 2) presence of active AVHs, 2) male or female between the ages of 18 and 65, 3) Korean ethnicity, and 4) fluency in written and spoken Korean. Patients were excluded if there was any evidence of DSM-IV-defined substance dependence (except nicotine and caffeine), mental retardation, or neurological disorders, including epilepsy, stroke, or severe head trauma. All patients were on antipsychotic medication. In the clinical group, we conducted unstructured clinical interview for DSM-IV and the presence of hallucinations. On the other hand, only self-report questionnaire was used in the nonclinical group. Both the nonclinical and the clinical groups completed the Korean version of the LSHS-R and the Korean version of the Perceptual Aberration Scale (PAS). The Minnesota Multiphasic Personality Inventory-2 (MMPI-2) was used in the nonclinical group, and the PANSS hallucination item was used in the clinical group based on structured interview using the PANSS instructions. The investigators were trained for high reliability in using the PANSS items. Written informed consent was obtained from all subjects prior to enrollment. The study protocol was approved by the institutional review boards of Seoul National University Hospital and SMG-SNU Boramae Medical Center.

2.2. Instruments

2.2.1. LSHS-R

The 12-item LSHS-R (Bentall and Slade, 1985) was translated into Korean by two board-certified psychiatrists (HYJ and JSC) and translated back into English by a native English speaker (SH) to verify the consistency of the original items. The translation was rechecked by both Korean- and English-language specialists. Each item was scored 'certainly applies to me' (4), 'possibly applies to me' (3), 'unsure' (2), 'possibly does not apply to me' (1), and 'certainly does not apply to me' (0). The LSHS-R total score ranges between 0 and 48, with higher scores indicating a greater predisposition toward hallucinatory experiences.

2.2.2. PAS

We used the Korean version of the PAS (Chapman et al., 1978), which was previously standardized and validated in a Korean sample (Cronbach's alpha = 0.92, test–retest reliability = 0.90) (Choi and Yang, 1997; Yang, 1997). This instrument was developed for the assessment of perceptual distortions related to body image (28 items) and other objects (seven items). It consists of 35 items with a true/false response format, with higher scores indicating a greater tendency toward perceptual aberrations. Total scores range from 0 to 35 points.

2.2.3. MMPI-2

The MMPI-2 has been shown to have the ability to detect both schizophrenia and schizophrenia-related conditions (Matsui et al., 2002). Among the 10 clinical scales of the MMPI-2, only the schizophrenia scale (Sc) showed a statistically significant correlation with the LSHS total score in a nonclinical sample (Butcher et al., 1989; Han et al., 2006). Therefore, we used the Korean version of the MMPI-2 and computed the Sc score for further analysis. The Sc scale was the primary component to distinguish subjects with either schizophrenia or schizophrenia spectrum disorder from students without such disorders (Matsui et al., 2002). The Sc scale may be an indicator of a heightened risk of schizophrenia (Subotnik et al., 2005). In this study, the Sc scale of the MMPI-2 was used to screen the subjects with a potential risk of psychosis in the nonclinical group (cut-off T-score = 60).

2.2.4. PANSS

To assess the severity of hallucinations in the clinical group, we used the P3 item on the Korean version of the PANSS (Kay et al., 1987; Yi et al., 2001). We previously reported that a self-report questionnaire of AVHs showed good agreement with the P3 on the PANSS (Kim et al., 2010).

2.3. Data analysis

The internal consistency of the LSHS-R was analyzed using Cronbach's alpha (Cronbach, 1951). The PAS total score was utilized to assess the concurrent validity of the LSHS-R. Correlational analyses were conducted to confirm the validity of the LSHS-R in the nonclinical group using the PAS and the MMPI-2 total scores. The factor structures of the LSHS were explored in the clinical sample using a principal component analysis (PCA) with a single varimax rotation. The Kaiser criterion (Eigenvalue > 1) was used to determine the number of factors. Based on the results of the PCA, we performed the confirmatory factor analysis (CFA) in the nonclinical sample. The parameters for fit estimation in the CFA were the relative chi-square (χ^2/d.f.), the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), and the Tucker–Lewis index (TLI). Although there is no consensus regarding an acceptable ratio for χ^2/d.f., ratios smaller than