Suggestibility and source monitoring deficits in hallucinations: Cross-cultural studies of the relationship between dissociation, inner speech qualities and hallucinatory experiences

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By

Fatimah Hamdi Alganami

Primary Supervisor: Professor Richard P. Bentall

Secondary Supervisor: Professor Graham F. Wagstaff

Institute of Psychology, Health and Society

University of Liverpool

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ABSTRACT

The research in this thesis on hallucinations, with both clinical and non-clinical samples, explores the relationships between hallucinations, reality discrimination biases, suggestibility, dissociative experiences and inner speech qualities. The thesis comprises 5 studies that tested: first, the impact of suggestibility on signal detection performance (a measure of reality discrimination); second, the relationships between hallucination proneness/hallucinations, suggestibility and dissociation when and when not controlling for the confounding effects of symptoms that frequently covary with hallucinations (i.e., paranoia and depression); third, the associations between hallucinations and childhood trauma, taking into account the mediating role played by dissociative process and qualities of inner speech. The studies were conducted in the UK and Saudi Arabia, allowing a demonstration that the findings are valid cross-culturally.

One main finding is that hallucination proneness and hallucinations are associated with reality discrimination deficits (i.e., signal detection biases) as reported in many previous studies, and also with suggestibility and dissociation even after controlling for comorbidity. However, the reality discrimination deficits of hallucination-prone individuals and hallucinating patients were influenced by context (suggestions). The results of the correctional analyses revealed strong relationships between hallucinations and hallucination proneness with childhood trauma, especially sexual abuse. In addition, dissociative experiences and other people in inner speech mediated this relationship. Findings from students and patients in Saudi Arabia were similar to those obtained from students and patients in the UK in previous research, and to the findings from UK students in the present series of studies.

The clinical implications of the findings are discussed.

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DECLARATION IN HIGHER DEGREE THESES

DECLARATION

This thesis is the result of my own work. The material contained in the thesis has not been presented, nor is currently being presented, either wholly or in part for any other degree or qualification.

Signed ……… *Fatimah* …….………..….(candidate)

Date ………… 1/12/2016 ………………(candidate)

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

Introduction to the thesis

1.1 Abstract

Cumulative evidence from genetic, social and psychological enquiries provides strong indication of the causal role of the social environment in mental health diagnoses comprising severe mental illnesses, for example schizophrenia. The first aim of this narrative review is to assess the heterogeneity, and determinants of schizophrenia and its prevalence worldwide, and to present information about specific symptoms and symptom dimensions of schizophrenia, and to provide an approach to genetic issues, course and outcome, ending by discussing the cultural context. The second aim is to introduce the concept of hallucinations and its prevalence, the risk factors and the traumatic impact, enhancing also the role of cultural influences. The third aim is to discuss the cognitive models of hallucinations, inner speech and source monitoring paradigms, ending with reviewing the role of suggestibility and dissociative experiences on hallucinations.

1.2 Schizophrenia and culture

The term psychosis is used to indicate 'losing contact with reality' (e.g., Riedner, Ferrarelli, & Benca, 2015). The most severe form of psychosis, schizophrenia, is often considered a neurological disorder characterized by multiple psycho-pathological dimensions whose severity varies across patients and over the course of the disorder. The present concept of schizophrenia "dementia praecox" dates back to the efforts of Kraepelin (1919), Bleuler (1911), and Schneider (1959); (see Tandon, Nasrallah, & Keshavan, 2009). These three root-origins are reflected in almost all current definitions of schizophrenia: first, the stress on avolition, chronicity and poor outcome derived from the work of Kraepelin; second, the Bleulerian view that dissociative pathology is a major and crucial aspect of the illness, together with an emphasis on negative symptoms; third, the Schneiderian emphasis on reality distortion/positive symptoms (Tandon et al., 2013). In the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders 5th edition:

"Schizophrenia spectrum and other related disorders, and schizotypal (personality) disorder are defined by abnormalities in one or more of the following five domains: delusions, hallucinations, disorganised thinking (speech), grossly disorganised or abnormal motor behaviour (including catatonia), and negative symptoms" (DSM-5: American Psychiatric Association, 2013, p. 87).

For the diagnosis to be made, two or more of these criteria are needed in which each of these symptoms exist for at least a one month period (or less if successfully treated), and should implicate deficiency in one or more main areas of functioning including 'work, interpersonal relations, or self-care' (APA, 2013).

However, the segregation between schizophrenia and other disorders in the DSM remains unclear, and many other diagnoses involve similar symptoms or behaviours. Schizotypal personality disorder is noted to fall within the schizophrenia spectrum. This diagnosis involves a pervasive pattern of social and interpersonal impairments consisting of decreased ability for close relationships, cognitive or perceptual distortion and eccentricities of behaviour, with beliefs, thinking and perception abnormalities that are below a psychotic disorder diagnosis threshold. Brief psychotic disorder is defined as lasting more than a day but remitting within a month. Schizophreniform disorder is characterised by a symptomatic presentations similar to schizophrenia except for the duration of less than 6 months and the absence of a decline in functioning. In schizoaffective disorder, a mood episode and the active phase symptoms of schizophrenia occur together and are followed by at least two weeks of delusions or hallucinations without prominent mood symptoms. What is more, if delusional thoughts persist strongly during all the mood episodes, the diagnosis then is depressive or bipolar disorder and not schizophrenia (APA, 2013).

1.2.1 Symptoms and symptom dimensions

Auditory hallucination, experiences of control, delusion, disorder of thinking and emotional and volitional changes are argued to be the main symptoms of schizophrenia (Birchwood & Jackson, 2001), with hallucinatory experiences and paranoid ideations being the most obvious form of psychotic symptoms, which typically trouble younger people, frequently leading to lifelong incapability (Janicak, Marder, Tandon, & Goldman, 2014). However, patients also experience negative symptoms such as avolition/apathy and flat affect, and also disorganized symptoms such as formal thought disorder.

Given the heterogeneity of these symptoms, various attempts have been made to identify sub-categories of psychosis. An early approach pursued by both Kraepelin (1919) and Bleuler (1950) involved attempting to identify distinct subtypes (paranoid, disorganised, catatonic and simple forms of schizophrenia). However, the reliability of these subtypes was poor, and they did not provide the required heuristic approach to fully understand underlying disease processes (Buchanan & Carpenter, 1994).

A later approach to making the concept of schizophrenia more tractable was to try and specify the specific symptom dimensions. Andreasen and Black (2006) focused on three big main groups of symptoms: firstly, the psychotic dimension comprising hallucinations (sensory perceptions in the absence of external stimuli) and delusions (false beliefs, incompatible with the patient's social, religious, or educational background, arising from an inappropriate inference about external reality and not amenable to reason); secondly the disorganised dimension including disorganised speech, bizarre behaviour, and inappropriate affect; finally, the negative dimension comprising lack of volition and blunted affect. Liddle (1987) similarly argued that the symptoms of schizophrenia are clustered into three disorders: psychomotor poverty (negative symptoms); reality distortion/positive symptoms (hallucinations and delusions); and disorganization (bizarre behaviour, inappropriate affect, and disorganized thought). Cognitive deficits such as attention difficulties and impaired working memory have also been suggested as a fourth dimension of psychotic symptomatology (e.g., Riedner et al., 2015). These dimensions are argued to have different underlying neurobiological substrates and show distinctive patterns of response to the several treatments applied (Janicak et al., 2014).

Psychological research over the last two decades, therefore, has moved towards symptom-oriented and cognitive-developmental approaches to schizophrenia, as being more valid and useful than a simple medical disease model. These approaches encompass cognitive, neuropsychological, person-centred and phenomenological aspects, and have also focused on the consequences of symptoms for patients and their families (Bentall, Fernyhough, Morrison, Lewis, & Corcoran, 2007; Ruppin, Reggia & Horn, 1996).

Bentall et al. (2007) emphasizes two advantages of this approach. First, it allows the conceptual and therapeutic methods and perspectives developed by psychologists to be brought into the explanatory framework; and, second, since the concept of schizophrenia as a classification is disputed, a modern psychological approach focusing on specific symptoms (such as hallucinations and persecutory delusions) can take a neutral position about the rationality and validity of schizophrenia as a diagnostic category. A number of studies have also emphasised that the symptoms of schizophrenia for example hallucinations and paranoia may be affected by social, emotional, cultural and environmental factors, suggesting that separate causal pathways may be involved (e.g., Bentall, Wickham, Shevlin, & Varese, 2012).

Over the past three decades, the symptom-orientated approach to psychosis has been increasingly widely accepted, and research papers focusing on particular symptoms or symptom dimensions have increasingly appeared in the major psychiatric journals. An early critique of this approach was published by Mojtabai and Rieder (1998), who argued that; (i) the reliability of symptom assessments are lower than the reliability of diagnostic assessments; and (ii) symptoms have low heritability compared to diagnoses. With respect to the first of these points, Bentall (2003) has

pointed to data (for example on the reliability of PANSS assessments) which show that these symptoms can, actually, be assessed with greater reliability than broad diagnoses. With respect to the second point, recent developments in molecular genetics have revealed that the genetic risk of psychosis is massively polygenic and diagnostically non-specific (Owen, 2012), with the implication that there are no specific risk genes for 'schizophrenia' and that the higher heritability of diagnoses may simply be an artefact of selecting patients with multiple symptoms.

1.2.2 Prevalence and incidence

Most of the research on the prevalence of psychosis has focused on the schizophrenia diagnosis, which is a widely reported, affecting nearly 24 million individuals worldwide (World Health Organisation [WHO], 2001). Psychotic symptoms characteristically appear between the late adolescence and the mid-thirties; it is however, rare to have onset before teenage years, and lifetime prevalence appears to be almost between 0.3% and 0.7%, Early studies highlighted the similarity in the occurrence of the disorder in men and women across different cultures. On average, female develop the symptoms of the disorder three to four years later than males and display a discrete later peak (age 35 years and younger), at which point the disorder is over-represented (Eranti, MacCabe, Bundy, & Murray, 2013). For women, there appears to be a second peak of onset around the menopause (Bennett, 2011).

A recent review of 158 studies in different countries that had determined the incidence of schizophrenia found that it varies widely, between 7.7 and 43 per 100,000, with higher rates in the developed compared to the developing world. The overall male: female risk ratio was 1.4:1 (higher risk in males). Those born in or

living in cities were observed to carry a higher risk, as do immigrants, who have five times increased risk (McGrath, 2006).

Studies of clinical samples suggested that 1% or less of all reported cases with schizophrenia have an onset before the age of 10, and 4% before the age of 15 (Remschmidt, Schulz, Martin, Warnke, & Trott, 1994). However, in a meta-analysis of population based studies of research on psychotic symptoms in children and teenagers, the prevalence rates was 17% in children aged 9–12 years and 7.5% among adolescents aged 13–18 years (Kelleher et al., 2012). Horwood et al. (2008) also reported a 6-month prevalence in 11-year-old children of 13.7% for "suspected or definite" psychotic-like symptoms. Even though non-clinical psychotic signs were relatively common in children and the prevalence decreases in during adolescence, psychotic disorders were extremely rare and increased in incidence and occurrence throughout adolescence. It is well recognised that young individuals who report psychotic symptoms have a higher risk of eventually meeting the diagnostic criteria for schizophrenia (Poulton et al., 2000; Welham, Isohanni, Jones, & McGrath, 2009).

1.2.3 Genetic issues, course and outcome

Biological theories suggest a model in which genetic factors influence the risk for schizophrenia but do not form a single underlying cause (Gejman, Sanders, & Kendler, 2011). In a recent study of genetics which compared rates of schizophrenia in the adopted-away children of both mothers diagnosed with schizophrenia and those without schizophrenia, the risk for schizophrenia was fourfold greater among the children of the women diagnosed as having schizophrenia than among the children of the comparison mothers: a total incidence of 8.1% versus 2.3% (Tienari et al., 2000; Webb, Abel, Pickles, & Appleby, 2005). Nevertheless, this was not entirely due to

genetic factors, and the results from the study by Tienari et al. (2004) suggested an interaction between genetic and environmental factors. Children of women diagnosed with schizophrenia who lived in households where there was good communication between the family members were not at increased risk of schizophrenia (Bennett, 2011). In contrast, the children of women diagnosed as having schizophrenia who were placed in families with communication deviance were at greater risk of developing schizophrenia than children with healthy mothers who lived in such households (Tandon, Keshavan, & Nasrallah, 2008). Hence, the development of schizophrenia appears to depend on both genetic risk and communication deviance within the adoptive family.

Many other factors influence the course of psychosis, e.g., cognitive impairments, environmental risk factors and social and/or psychological processes (APA, 2013; Tandon et al., 2008). It is typically episodic with a poor prognosis. Of people who have one episode of schizophrenia, almost half experience a significant reduction in symptoms over the next five years (Bennett, 2011), although only a quarter are likely to maintain good social and vocational functioning, and only an eighth meets the criteria for complete recovery for two years or more (Robinson, Woerner, McMeniman, Mendelowitz, & Bilder, 2004).

1.2.4 Cultural context

'Culture refers to the unique behaviour and life style shared by a group of people, and includes customs, habits, beliefs, and values that shape emotions, behaviour and life pattern' (Tseng, 2003. p1). Although it has been defined in various ways, all definitions acknowledge some forms of shared and learned behaviour, passed from one generation to the next, for the purposes of individual and social

growth. Culture definitions also stress an objective (external) aspect consisting of artifacts, roles, and institutions, and a subjective (internal) aspect represented by shared beliefs, attitudes, values, and norms (Al-Issa, 1982). Even such inclusive definitions of culture, however, are incapable of accounting for the full diversity of meanings, implicitly or explicitly implicated by the term (Jablensky & Sartorius, 1975). It is widely accepted that understanding the cultural context of the experiences of mental disorders is crucial for effective diagnostic assessment and clinical management of schizophrenia. Hence, different cultural backgrounds should be considered especially between the clinicians and their patients, as what is seen as abnormal behaviour in one culture may seem less abnormal in another (APA, 2013).

To understand the aetiology of schizophrenia, it is therefore important to consider the interaction between religious, cultural, socio-economic, environmental, psychological, neurobiological, and metaphysical factors. For example, in a study of African-American, Latino and white majority Americans by Brekke and Barrio (1997) it was predicted that higher levels of psychotic symptoms would be found in minority groups on the basis of their disadvantaged social status. Instead, the nonminority group was consistently more symptomatic than the ethnic minority group with respect to symptom differences. This finding suggests that certain protective aspects of ethnic minority culture can result in a more benign symptomatic expression of schizophrenia. A further finding from the study was empirical support for potential socio-centric indicators as cultural mediators of the cross-ethnic symptom differences. Two socio-centric indicators of empathy and social competence were strong statistical mediators of almost all of the symptom differences between the ethnic minority and non-minority groups (Brekke & Barrio, 1997), suggesting that these variables might be part of a socio-centric cultural mechanism that is protective.

In a pilot study of schizophrenia which investigated 1202 patients in nine centres in China, Columbia, Czechoslovakia, Denmark, India, Nigeria, Soviet Union, United Kingdom, and the United States, young patients (both sexes) with recent onset functional psychoses were examined (Kulhara & Chakrabarti, 2001; WHO, 1973). The annual incidence of broadly defined schizophrenia was in the range of 1.5 to 4.2 per 10,000, of population at risk (age 15 and 44). The incidence of more narrowly defined schizophrenia ranged from 0.7 to 1.4 per 10,000. It was claimed that the findings from the narrow definition indicated comparable incidence rates across cultures but, in fact, quite large differences were probably not detected because of the study's low statistical power. Differences became more obvious when the condition was broadly defined. The incidence of broadly defined schizophrenia was highest in India, in both rural and urban areas of Chandigarh. Subsequent studies from different parts of India have come up with similar rates (34.4 per 10,000) in both urban and rural areas. (Kulhara & Chakrabarti, 2001; Rajkumar, Padmavathi, Thara, & Menon, 1993; Wig et al., 1993)**.** The differences in rates of the broad category have been interpreted to suggest that it comprised of a large number of cases of other psychotic disorders, mainly acute psychoses, which are far more frequent in developing countries (Susser & Wanderling, 1994)**.**

Others have suggested the influence of physical environmental factors, such as infections on the distribution of schizophrenia. (Yakeley & Murray, 1995). The latter possibility is bolstered by some Western studies suggesting that there has been a substantial decrease in admission rates for schizophrenia, over the past few decades, which has sometimes been attributed to better protection from infections (Eagles, 1991; Kulhara & Chakrabarti, 2001).

However, WHO-led comparisons of incidence and prevalence rates of psychosis have been widely criticised for being insensitive to culture (Kleinman, 1988). To understand how culture is important while trying to diagnose patients suffering from psychosis, attention needs to be given to the way that symptoms are experienced and interpreted in different cultural contexts. For example, in some cultures such as Algerian (Al-Issa, 1990), and Bangladeshi (Wilce, 2004), symptoms of auditory hallucinations or catatonia are regarded as a common part of religious experiences which are culturally normalised. This legitimisation is validated by the fact that cross-cultural researchers have reliably confirmed that schizophrenia is different with respects to culture, with a better course of recovery and outcome observed in non-Western societies (Jenkins, Jenkins & Barrett, 2004). For instance, in a 12-year follow-up survey of schizophrenia patients of first admission in Mauritius, showed that 59% of the cases had no symptoms at the end of 12-year follow-up period; this was possibly one of the first studies in the developing world that, providing evidence for the 'better outcome hypotheses' (Murphy & Raman, 1971).

1.3 Hallucinations

Hallucinations have been defined as "any percept-like experience that a) occurs in the absence of an appropriate stimulus, b) has the full force or impact of the corresponding actual (real) perception and c) is not amenable to direct and voluntary control by the experiencer" (Slade & Bentall, 1988, p. 23). They can be experienced in any sensory modality (APA, 2013). Beck and Rector (2003) have defined hallucinations more simply as an experience that occurs perceptually while the external stimulation is absent.

A recent study categorized auditory hallucinations into two broad types: verbal auditory hallucination and non-verbal auditory hallucination. The former experiences typically comprise a human or non-human voice; they might be spoken in normal voice tone, or they could be shouting or whispering voice (in which case the actual content may not be discernible). The non-verbal auditory hallucination, on the other hand, might include 'noises', such as a machine sound, barking, whistling music or a tone, or tinnitus-like experiences similar to hissing, humming, clicking or ringing. Musical hallucination is seen as a complex sort of non-verbal hallucination (for more details, see Blom and Sommer, 2010).

Auditory verbal hallucinations are common in patients with a diagnosis of schizophrenia, who often find it difficult to say whether the 'voice' is inside or outside the head (Junginger & Frame, 1985; Nayani & David, 1996). Sometimes it is only the content of the utterance which persuades the individual of its non-self provenance (Bentall & Varese, 2013). The range of the form and content observed has become the subject of detailed and systematic phenomenological study during the twentieth century (e.g., Chadwick, & Birchwood, 1994; Carter, Mackinnon, Howard, Zeegers, & Copolov, 1995). Most researchers assume auditory hallucinations to be a consequence of abnormal inner speech (Bentall, 1990; Anthony, 2004; Stephane, Kuskowski, McClannahan, Surerus, & Nelson, 2010), so that the self-generated inner speech is being ascribed to others (Frith & Done, 1988). Attempts to further subdivide auditory verbal hallucinations into different subtypes - for example an old proposal by Jaspers, (1963) that tried to distinguish between true hallucinations (experienced in external subjective space) and pseudo-hallucinations (experienced as internally located) - have not proven to be enduringly influential. Analyses of phenomenological data has suggested that auditory verbal hallucinatory experiences vary along three

relatively independent dimensions: whether they are located internally or externally, whether they are attributed to self or to another agent (some patients report that their voices seem external but that they know that they are self-generated) and their linguistic complexity (varying from single words to conversations) (Bentall & Varese, 2013; Stephane, Thuras, Nasrallah, & Georgopoulos, 2003).

Visual hallucinations, on the other hand, can be defined as a complaint in which individuals claim to see something or behave as if they see something that an observer cannot see (Cummings & Miller, 1987). They have been classified into two broad categorizes; simple (e.g., dots, lines, lights, flashes and other non-formed perceptions) and complex (e.g., people, animals and objects) (Collerton, Dudley, & Mosimann, 2012). In people with psychotic disorders, these experiences often but not always coincide with auditory hallucinations (Oorschot et al., 2012) and are usually associated with distress. It has been reported that visual hallucinations are more common in patients with a diagnosis of schizophrenia compared to schizoaffective disorder (between 16 and 72%) (Collerton et al., 2012). They are also most prevalent during a first episode of psychosis (affecting about a third of patients, when they usually consist of a human-like figure) and then become less frequent with time and intervention, suggesting that they are transitory, and explaining why they are less prevalent than auditory hallucination in unselected clinical samples (Dudley, Collerton, Nicholson & Mosimann, 2013). In schizophrenia patients they are usually attributed to confusion between mental images and perceptions (Brébion, Ohlsen, Pilowsky, & David, 2008), and are associated with decreased use of verbal strategies in memory (Brébion, Ohlsen, Pilowsky, & David, 2011).

It has been recognised that hallucinations experienced by non-clinical individuals are often pleasant or positive (Bentall, 1990; Morrison, Haddock, &

Tarrier, 1995). Morrison and colleagues (1995) have argued that, when this is the case, they could be a consequence of positive intrusive thoughts that are inconsistent with the individuals' meta-cognitive beliefs and self-concept. Nevertheless, they are typically frightening and unpleasant when they are experienced by hallucinating patients, and they may be associated with violence (e.g., Juninger & McGuire, 2001). Command hallucinations have also received particular attention. In fact, although the majority of psychiatric patients with these kinds of voices sometimes obey them, and although it is not uncommon for voices to urge attacks against other people, it is not clear whether this results in an increased risk of dangerous behaviour (Fox, Gray, & Lewis, 2004; Juninger & McGuire, 2001; Kasper, Rogers, & Adams, 1996; McNeil, Eisner, & Binder, 2000).

Not surprisingly, the extent to which patients obey hallucinated commands depends, not only on the nature of the commands, but on beliefs about the voices, with obedience more likely if the voice is believed to be benevolent, authoritative, or uncontrollable (Beck-Sander, Birchwood, & Chadwick, 1997). The extent to which individuals feel subordinate to their voices seems to be closely related to the extent to which they feel subordinate in other social relationships (Birchwood, Meaden, Trower, Gilbert, & Plaistow, 2000). These kinds of beliefs may also help to explain why some people who hear voices seek psychiatric help whereas others do not; in a contrast to patients with non-patient hallucinators it was found that the former commonly believe that they are weaker than their voices while in the non-patients hallucinators the opposite is true (Honig et al., 1998). However, only a handful of investigators have observed these experiences of hearing voices as being probably meaningful and insightful to the individuals going through such experiences for intervention and treatment purposes (e.g., Bentall, 2004).

15

1.3.1 Prevalence

Auditory and visual hallucinations are quite common in patients with severe mental illnesses (Baethge et al., 2005; Loue & Sajatovic, 2008), especially psychotic patients who are diagnosed as suffering from early schizophrenia in the UK (177 patients out of 255; 69%) (Tarrier et al., 2004). Nevertheless, they are also experienced by approximately 10% of patients diagnosed as suffering from bipolar disorder (Goodwin & Jamison, 1990) or major depression (Lattuada, Serretti, Cusin, Gasperini, & Smeraldi, 1999). They also affect healthy individuals who never come into contact with psychiatric services.

Tien (1991) described two large studies that were carried out to highlight the distribution of hallucinations in general populations; the first was the Sidgewich Study carried out in the late 19th century and the other was The Epidemiologic Catchment Area Programme (ECA) carried out in the 1980s. The former recruited 17,000 subjects largely from England followed by Russia and Brazil. The latter assessed initially, 18572 participants in New Haven, Baltimore, Durham, St. Louis and Los Angeles. The results from both studies suggest a surprisingly high prevalence of hallucinations in the general population. Results from ECA, for example, revealed that the annual incidence rate for hallucinations (the numbers experiencing hallucinations during the year of study) was estimated at between 4 and 5 percent, and the lifetime prevalence rate was estimated at between 10 and 15 percent.

More recently, it has been reported that 4% of the general population in England and Wales have experienced hallucinations in the form of "hearing or seeing things that others could not" (Johns, Nazroo, Bebbington & Kuipers, 2002). A recent review has reported considerable similarities in the phenomenology of voices reported

by clinical and non-clinical participants, so that people who experience hallucination vary considerably in their need for care (Johns et al. 2014). Longitudinal studies suggest that auditory hallucinations that are associated with clinical status are usually associated with negative emotional states, particular cognitive problems and poor coping, in addition to family history of psychotic disorders, and environmental adversities such as childhood abuse. These observations support the concept of a continuum which goes from ordinary functioning, through frank oddness to full blown psychosis (Van Os, Hanssen, Bijl, & Ravelli, 2000).

Worldwide, early studies of psychotic hallucinations confirmed clinical and empirical observations of the frequency of both auditory and visual varieties. For example, Zarroug (1975) found that over 78 % of his Arabic patients with schizophrenia had hallucinations in at least one modality, primarily auditory (62 %) or visual (47 %), whereas Ndetei & Singh (1983) found that 61 % of their Kenyan schizophrenia patients had at least one form of hallucination, chiefly auditory (43 %) or visual (43 %). It also appears to be true that the rate of hallucination varies considerably in different settings. Bauer et al. (2011), using identical inclusion/exclusion criteria and identical assessment procedures, compared persons with schizophrenia in 7 different countries (Austria, Poland, Lithuania, Georgia, Pakistan, Nigeria, and Ghana). In all settings, patients were more likely to report auditory than visual hallucinations, but the 1-year prevalence rates in patients ranged considerably, in the case of auditory hallucinations from 67% (Austria) to 91% (Ghana) and, in the case of visual hallucinations, from 4% (Pakistan) to 54% (Ghana). Thomas et al. (2007) using identical inclusion/ exclusion criteria and identical assessment procedures and comparing US patients and Indian patients, found similar results.

1.3.2 Risk factors and traumatic impact

Recent research has highlighted the importance of environmental effects affect in the risk of experiencing psychotic symptoms, and becomes especially clear when relationships between precise symptoms and precise types of environmental features are considered (Bentall & Fernyhough, 2008; Bentall & Varese, 2013). Hallucinatory voices tend to be heard differently under particular environmental conditions, e.g., when patients with a history of hallucination were exposed to carefully controlled environmental conditions, they reported that their voices were loudest and most frequent when they were exposed to either sensory restriction 'wearing ear mufflers' or white noise 'noise containing a random selection of frequencies' (Bentall & Varese, 2013; Gallagher, Dinin, & Baker, 1994; Margo, Hemsley, & Slade, 1981). Clinical reports suggest that stress can trigger hallucinations in vulnerable individuals (Siegel, 1984), where one specific form of stress 'passing for example' generally aggravates hallucinations in non-clinical people (Grimby, 1998). In a study in which psychotic patients kept detailed records of their experiences using the Experience Sampling Method (ESM) during one-week period. It was appeared that the onset of hallucinations was preceded by high levels of stress and negative affect (Delespaul & van Os, 2002).

Other environmental factors appear to have their negative affect much earlier in the life histories of people who hear voices. Several studies have reported a high occurrence rate of trauma and experiences of abuse amongst severe mentally ill patients (Goodman, Rosenberg, Mueser, & Drake, 1997; Neria, Bromet, Sievers, Lavelle, & Fochtmann, 2002; Read, van Os, Morrison, & Ross, 2005). Comparable findings have also been reported in samples of non-clinical individuals (mostly

students) who score highly on questionnaire measures of psychotic-like experiences (Bentall & Slade, 1985b; Latasker et al., 2006).

Childhood trauma is a common experience worldwide, with estimations that nearly a third of the general population may be affected (Kessler et al., 2010). In a recent investigation in the UK, it has found that the incidence of childhood sexual abuse is about 11% and physical abuse is about 24% (May-Chahal & Cawson, 2005). There is considerable evidence suggesting that adversities in childhood such as separation from parents, neglect and sexual abuse are linked to psychosis in later life; signifying certain pathways between particular types of adversity and particular symptoms of psychosis (Varese et al., 2012; Bentall et al., 2014).

When specific psychotic symptoms have been examined, a robust relationship has been repeated observed between childhood trauma and hallucinations. One of the earliest signs of this connotation is the similarity between hallucinations and the symptoms of post-traumatic stress disorder (PSTD) (Morrison, Frame, & Larkin, 2003). The re-experiencing complaints in PTSD involve trauma-related intrusive thoughts, distressing dreams and dissociative flashback incidents in which the individual vividly re-experiences the triggering event. The strength and the vividness of these complaints, as well as their intrusiveness and involuntary nature, are in agreement with the phenomenological characteristics of psychotic hallucinations (see Bentall & Varese, 2013). Hallucinations with trauma-related content have been observed both in PTSD patients (Butler, Mueser, Sprock, & Braff, 1996; Hamner et al., 2000) and psychotic patients with a history of single or multiple trauma (Hardy et al., 2005; Read & Argyle, 1999).

British research on patients who diagnosed as suffering from bipolar disorder has reported the same result (Hammersley et al., 2003), demonstrating that the association between psychosis and trauma transcends traditional diagnostic boundaries. Analogous relations between trauma and delusions (the other major symptom of psychotic illness) have not been established (Famularo, Kinscherff, & Fenton, 1992; Hammersley et al., 2003). Indeed, patients and healthy participants who hear voices often report that traumatic experiences (or events that reactivate memories of past trauma) directly trigger their first hallucinatory experiences (Honig et al., 1998; Romme & Escher, 1989). In a population-based survey of over 17,000 citizens of California, it was found that a history of childhood trauma caused a five-fold increase of experiencing hallucinations, which was independent of the effects of substance abuse (Whitfield, Dube, Felitti, & Anda, 2005). Similarly, traumatic childhood experiences were found to be associated with auditory, visual and tactile hallucinations in an even larger US epidemiological sample, where the probability of experiencing hallucinations was related, in a dose-response way, with the severity of trauma. (Shevlin, Dorahy, & Adamson, 2007) and in the British Adult Psychiatric Morbidity Survey of 2007 (Bentall et al., 2012). In studies of schizophrenia patients, it has been found that hallucinations were more closely linked the history of traumatic experiences (Lysaker & LaRocco, 2008; Whitfield et al., 2005, Wickham & Bentall, 2016).

Psychiatric patients occasionally state that the content of their hallucinations corresponds to the nature of past trauma (Read, Agar, Argyle, & Aderhold, 2003). A study recruiting patients with the diagnosis of schizophrenia, has reported thematic links between the content of hallucinatory voices and the experience of past trauma (Hardy et al., 2005). Yet, a literal association between the content of hallucination and

earlier trauma was observed in only 12.5% of those patients who experienced past traumatic situations (Bentall & Varese, 2013).

1.3.3 Cultural influences on the phenomenology of symptoms

Although symptoms of schizophrenia occur in all cultures (Jablensky & Sartorius, 1988), the content of the symptoms varies considerably. Socio-cultural and cultural psychiatry studies have attempted to assess the impact of ethnic and cultural features and factors on the individual's behaviour and emotions across cultures and/or across sub-cultures, and precisely, to evaluate the relationship between cultural factors of mental illness. They have also sought to improve clinical therapy and knowledge of social and cultural roles on patients' lives and through their families (Lefley, 1990; Tseng, 2003). Likewise, socio-cultural studies have shown that culture has key effects on the course and prognosis or outcome of mental illness, which could affect all dimensions of hallucinatory phenomena: in identification, in experience, in content, in frequency, in meaning, in the distress they elicit, and in the way in which others respond to it (Larøi et al., 2014).

It has been assumed for many years that severe psychotic complaints are documented across cultures with a similar form of symptoms, in spite of growing awareness that culture might shape the meaning, content, and perhaps the severity of these symptoms (Larøi et al., 2014; Murphy, 1976). The content of hallucinations could be certainly influenced by local culture (Larøi et al., 2014). Al-Issa, (1995) has proposed that Euro-American culture itself inhibits the occurrence of hallucinations because the shared culture struggles to clarify and distinguish whether a particular experience is real or imaginary. When individuals appear to be unable to make such a distinction, they are likely to be labelled as out of contact with reality and therefore

ill. In contrast, Al-Issa argued, many non-Western societies do not make such a rigid distinction between reality and fantasy. One might therefore expect that hallucinations would be more readily reported outside of the Western setting (Larøi et al., 2014).

The cultural differences would be explicable by taking socio-cultural and political backgrounds into account. For example, Azhar, Varma, and Hakin (1993) examined phenomenological differences in hallucinations between schizophrenia patients in various areas of Malaysia. There were significant differences indicating that culture affects the phenomenology of hallucinations, even among people of the same race but from different regions. The Fourth National Survey of Ethnic Minorities, was conducted between 1993 and 1994, exploring the experiences of ethnic minority people living in England and Wales (of White, Caribbean and South Asian individuals), and covered mental health, physical health and a range of socio-economic and demographic variables. Reports of hallucinations varied significantly across the three ethnic groups, with the highest rate in the Caribbean group (9.8%) and the lowest in the South Asian group (2.3%) (Johns et al., 2002). This result is consistent with another study by Nazroo (1997) which implied rates of hallucinations in Caribbean migrants compered to non-migrants groups.

A few numbers of studies however, have been conducted on patients from Saudi Arabia, where visual and auditory hallucinations are a common occurrence and content is related to cultural background (e.g., Zarrouk, 1975). Kent and Wahass (1996) studied the characteristics and content of auditory hallucinations reported by schizophrenia patients from Britain and from Saudi Arabia. The content of the voices was influenced by the patients' cultural background. Most Saudi patients reported that their voices involved religious and superstitious themes, while the British patients were most likely to report the giving of instructions. A related study by Wahass and

Kent, (1997a) revealed that coping mechanisms were also affected by cultural background, Saudi patients were most likely to use religious behaviours to cope with their voices (43% engaged in prayer or read the Holy Book, the "Quran", whereas only 3% of UK patients reported comparable activities), British patients on the other hand, were more likely to use distraction (42% vs. 5% for Saudis) and physical activities (61% vs. 14%).

It is clear that culture-compatible strategies need to be employed in order to help patients with psychosis. Additionally, some strategies that are generally acceptable to Western patients may not be acceptable to most Islamic patients. For example, listening to music is not allowed, so that alternatives may be required for Muslim believers (Wahass & Kent, 1997b). At this point it is not clear whether psychological techniques are suitable for use with patients from non-Western backgrounds, an issue that is significant not only for patients who live in non-Western countries but also for those who have emigrated to the West. In due course, culture shapes hallucinations in both their pathological and non-pathological forms (Larøi et al., 2014). Consequently, when studying differences in psychiatric complaints between societies, it is essential to take into consideration both the possible demographic variances (e.g. in gender, marital and socio-economic status) and the cultural meanings connected to those variances.

1.4. Cognitive models of hallucinations

Modern cognitive models of auditory hallucinations adopted the idea that more than one mechanism is likely to be involved in the development of psychotic hallucinations; it is usually assumed that they arise due to dysfunctional activation of

corresponding internal auditory representations (Badcock & Hugdahl, 2012; Hugdahl, 2009)

The cognitive and neural mechanisms underlying auditory hallucinations in psychotic and non- psychotic groups are likely similar. One type of explanation has focused on mechanisms that control or limit conscious experience (e.g. Frith, 1979; Bullen & Hemsley, 1987). More specifically, their presence has been attributed to a reduced capability to inhibit intrusive thoughts and memories, which appears to explain why the sufferers do not feel they have direct voluntary control over the experience, which is a crucial element in the definition of auditory hallucinations (Anthony, 2004). The propensity to more frequent cognitive intrusions has also been associated with abnormalities in source memory and contextual integration. For example, Bentall et al. (2007) have argued that the deficits in source memory and auditory hallucinations might be linked to developmental improvements in source discrimination associated with maturation of the frontal lobes. Therefore, individual differences in temporal context memory during childhood and adolescence might be expected to raise vulnerability to auditory hallucinations even prior to psychosis and deserves more empirical investigation. A recent study has confirmed that damaged emotion regulation, which depended heavily on frontal resources (Gyurak et al., 2009), worked to increase both the frequency and distress of auditory hallucinations in schizophrenia (Badcock, Paulik, & Maybery, 2011). Another study has reported that a deficit in the supplementary motor area (SMA) implicated in self-originated actions during the process of speaking. This deficit resulted in a failure to recognise that the speech was generated by the self, and thus the hallucinators may consider it as hallucinations (Stephane, Hagen, Lee, & Uecker, 2006).

Another hypothesis was that hallucinations could be a result of attention

failure. For example, Hemsley (1996) argued that psychotic people with hallucinations are incapable of filtering out irrelevant and unwanted stimuli, or deciding which are/are not fitting elements of their environment to respond to, so that they attend to everything within that environment. Consequently, they feel inundated by sensory experiences/information and find it very hard, to focus on, and to react to, their environment in proper way. Negative symptoms (such as social withdrawal, deprived speech, and flat affect) on the other hand, might be an outcome of sensory overload, and/or as a coping strategy with that sensory burden (Bennett, 2011).

1.4.1 Inner speech

Inner or 'self-directed' speech can be defined as a conversation that occurs internally (i.e. talking to oneself) while a person is thinking; this leads to the idea that auditory-verbal hallucinations occur when the individual attributes his/her thoughts to someone else (Bentall, 1990; Ditman & Kuperberg, 2005). Inner speech has been implicated in short term memory (Baddeley, 2007), which is thought to facilitate important forms of metacognitive thought (Langland-Hassan, 2014). Regarding the development of inner speech, in early years and according to Vygotsky (1962), children first learn social speech in the companionship with one or more of their family members, and, in addition to issuing and responding to verbal directions in conversations with others, they then discover that they can issue and respond to commands in conversations with themselves. Thus, 'private speech' (speech which is self-directed but audible to others) is efficient and becomes recognized as a valuable method of self-regulation. Afterward, the child learns to use self-regulatory speech in a covert way, at which point private speech develops to inner speech. Ultimately, inner speech turns into concise and quite distinct from social speech (e.g., Bentall & Varese, 2013), as a results, inner speech can be understood more appropriately - as

suggested by Vygotsky - in terms of its being the endpoint of a developmental process (Jones & Fernyhough, 2007). It has been argued that the rational sense of self might be dependent on the dialogue between the different self-positions that can be either integral or antithetical (de Sousa, Sellwood, Spray, Fernyhough, & Bentall 2016).

This normal experience of inner speech, in turn, might be altered into the abnormal experience of commenting voices, a classical symptom of schizophrenia. Stephane et al. (2010), have claimed that hallucinations are often experienced in outer space, and examined inner-outer and outer-inner space bias in schizophrenia patients. The results confirmed that the patients showed confusion in both spaces, arguing that patients with inside-head hallucinations have the highest possibility of experiencing outer-inner space misattribution.

Bentall (1990) has argued, on the basis of experimental evidence available at the time, that patients suffering from auditory hallucinations have difficulties to discriminate between internally- and externally-generated events in their perceptual experience, and that hearing voices therefore occurs when individuals mark elements of their inner speech wrongly as coming from an external origin. It has been suggested that two types of abnormalities in inner speech might contribute to this kind of error. First, in the disruption to internalisation model, the typical process of internalisation is disturbed, with the result that the adult's inner speech is incompletely abbreviated, and retains many of the superficial features of external dialogue. Second, in the re-expansion model, fully internalised inner speech is temporarily re-expanded into an inner dialogue which retains the give-and-take structure of external dialogue. In both models, the resulting dialogue continues to take place in the absence of any external stimulus; that is, 'silently' in inner speech,

meaning that the voices in the dialogue are perceived as having an external source (Fernyhough, 2004).

1.4.2 Source monitoring

Source monitoring refers to a set of processes that are used to initiate attributions about the origins of memories and experiences (Johnson, Hashtroudi & Lindsay, 1993). The reality discrimination model of hallucinatory experiences has gained practical support from research which has compared hallucination-prone, healthy non-clinical individuals and hallucinating patients. A number of experimental techniques have been used to examine the suspected process of misattribution believed to underlie hallucinatory experiences, including source monitoring, self-monitoring and signal detection paradigms (for a review, see Ditman & Kuperberg, 2005). The results from studies which have used such approaches showed that patients who experience hallucinations, or healthy participants with high hallucination predisposition, are impaired in their ability to distinguish between self-generated and external events, which could result in misattributing internally generated cognitions to an external source (e.g. Beck & Rector, 2003; Bentall, Baker, & Havers, 1991; Bentall & Slade, 1985a; Choong, Hunter & Woodruff, 2007; Morrison & Haddock,1997; Rankin & O'Carroll, 1995; Varese, Barkus & Bentall, 2011, 2012; Vercammen, De Haan, & Aleman, 2008).

A recent meta-analysis of a group of experimental studies testing the associations between self-recognition deficits and auditory hallucinations in patients with schizophrenia spectrum diagnoses by Waters, Woodward, Allen, Aleman, and Sommer (2012) has revealed that patients with psychosis are characterized by poorer self-recognition comparing to healthy individuals. A similar meta-analysis showed

that these impairments seemed to be more noticeable among psychotic patients with auditory verbal hallucinatory experiences (Brookwell, Bentall, & Varese, 2013). Three types of paradigms were considered in these meta-analyses: signal detection theory (e.g., Bentall & Slade, 1985b), source monitoring (Bentall et al., 1991), and self-monitoring (Johns et al., 2001).

Signal detection (SDT) is a method that is used to study the ability of individuals to detect stimuli against background noises (Bentall & Varese, 2013). Behavioural data gathered through this procedure are classified as hits (positive response when the signal is presented), false alarms (positive responses when the signal is absent), misses (negative responses when the signal is presented) and correct rejections (negative responses when the signal is absent). Within the framework of SDT, two measures can be determined: perceptual sensitivity which refers to the accuracy of the detection of the presented signal, and response bias, which reflects the way in which a participant chooses to decide whether the stimuli was perceived correctly or not under conditions of uncertainty. In the case of perceptual sensitivity, scoring zero reveals a strong inability to distinguish between the added signal and the background noise, while higher perceptual sensitivity shows a better ability to quickly and correctly discover the added signal; whereas, in the response bias scheme, scoring lower than 1 reveals a bias towards reporting signals when uncertain, while scoring equal to 1 shows no response bias. The typical task consists of one 8-min block of sixty 8-s trials. Each consists of one 5-s burst of white noise followed by 3-s of silence. During 60% of trials, a 1-s voice is present during the white noise. A third of the time the voice is clearly audible; in the remaining trials the voices are harder to detect. Stimuli were present through stereo headphones. After each trial, participants were requested to indicate whether they perceived a voice by pressing mouse buttons

labelled 'yes' or 'no' (Bentall & Slade, 1985a; Barkus, Stirling, Hopkins, McKie, &
Lewis, 2007).

Most studies that have applied this technique have showed that hallucinations
and hallucination-proneness are associated with more response bias but not with
perceptual sensitivity impairment (e.g. Barkus et al., 2007; Rankin & O'Carrol, 1995;
Varese et al., 2011, 2012). The procedure of this paradigm was first used by Bentall
and Slade (1985a) who examined signal detection deficits in both clinical and non-
clinical subjects. Findings indicated that patients who were experiencing
hallucinations had a greater response bias when detecting the stimuli than non-
hallucinating patients. Furthermore, healthy individuals who have predisposition to
hallucination showed the same results in comparison to those who scored lower on the
hallucination proneness questionnaires (e.g., LSHS-R; Bentall & Slade, 1985b). On
the whole, the results from these research disclosed that patients hearing voices gave a
clear tendency to present false alarms under the conditions of uncertainty (Bentall &
Varese, 2013).

In contrast to the SDT, the self-monitoring and source monitoring tasks
required making explicit judgment for the source of self-generated items. The self-
monitoring task attempts to measure the on-line monitoring of self-generated dialogue
(Johns, Gregg, Allen, Vythelingum, & McGuire, 2006; Johns & McGuire, 1999). In
this paradigm, individuals are asked to speak out loud a list of words into a
microphone, the pitch is then manipulated, and the speech is played back to the
participants. At various points in the experiment, the participants are presented with
someone else's pre-recorded voice pronouncing the same word. Participants are
requested to identify the correct origin of the auditory feedback. In a study by Johns et
al. (2001) schizophrenia patients who experienced hallucinations were more likely

than both non-hallucinating patients and normal controls to wrongly attribute self-generated voices to an external source. A similar pattern of results was also found by Allen et al. (2004). Furthermore, there was a report of defective self-monitoring which was linked to the occurrence of auditory hallucinations and or passivity symptoms regardless of the diagnosis of psychosis (Blakemore, Smith, Steel, Johnstone, & Frith, 2000). However, one study used self-monitoring approach and did not give the same results, finding that reduced self-speech recognition was related not only to hallucinations in particular but to acute psychosis in general (Johns et al., 2006). Similarly, Versmissen et al. (2007) did not succeed in finding a significant relationship between self-to-other misattributions errors and hallucinatory experiences.

Finally, the source monitoring task tests discrimination the ability to identify the source of memories of self-generated content and heard items. For example, a study by Franck et al. (2000) argued that schizophrenia patients showed more deficits than healthy subjects in internal source monitoring, hallucinatory schizophrenia patients also showed more severe impairments than non-hallucinatory schizophrenia controls in a task that required them to discriminate between words read either aloud or silently. In a quite similar study by Keefe, Arnold, Bayen, McEvoy, and Wilson (2002), patients with schizophrenia showed consistently and significantly poorer performance when they were asked to recognize verbal items, compared with healthy controls. They also revealed a specific impairment in remembering the origin of the words, and that the impairment was greater when the words were self-generated.

In one of the first source monitoring studies, Bentall et al. (1991) examined hallucinating patients, patients with paranoid delusions but with no hallucinations, and healthy controls. The cognitive effort required to generate the items was manipulated

by using associates, (e.g. "Think of a kind of vegetable that begins with O" is a high effort item – people find it difficult to find the answer), They were also asked to learn pairs of words which are graded in difficulty according to the probability of the association (e.g. "Country – Norway" is low probability/high effort; "dwelling – house" is high probability/ low effort). Participants were later shown a list of words and asked to report whether they had been said by themselves, provided by the experimenters, or were new (foils). Outcomes indicated that schizophrenia patients who experienced hallucinations made more external misattribution with high cognitive effort self-generated words than other two groups and the findings were interpreted as evidence that they were unable to use cognitive effort as a cue when deciding the source. Over all, while the misattribution of self-generated items to an external source during source monitoring studies appears to be a general characteristic of patients with diagnosis of schizophrenia presenting with positive symptoms (Brebion et al., 1999), some studies have revealed that external misattribution mistakes were more frequently linked to hallucinations than other positive symptoms like delusions and thought disorder (e.g., Brebion et al., 2000).

To sum up, and despite some discrepancies, the evident picture from the three measures of source monitoring appears to strength the theory that source monitoring is impaired in individuals hearing voices (Bentall & Varese, 2013). In addition, the observation of externalizing biases in non-clinical hallucination- prone participants suggests that these cognitive processes might underlie hallucination proneness across the psychosis continuum. Studies are required to examine whether the association between externalizing bias estimates from source monitoring, self-monitoring and SDT paradigms correlate, and to determine whether they reflect a single process or

make independent contributions to hallucinations and hallucination proneness (Brookwell et al., 2013).

1.4.3 Suggestibility and hallucinatory experiences

There has been considerable interest in the possibility that there might be a link between hallucinatory and hypnotic phenomena. A current definition of hypnosis by American Psychological Association states that the induction of hypnosis is based on suggestion (Green, Barabasz, Barrett & Montgomery, 2005). Hypnosis, in turn, has been described as the belief in a suggested experience that is not consistent with independent reality (Kihlstrom & Hoyt, 1988). An old research paper by Weitzenhoffer and Sjoberg (1961), moreover, noted that an individual might respond to a number of suggestion instructions without any formal hypnotic procedure and that that some subjects show hypnotic-like behaviour in the absence of any formal induction.

Imaginative suggestibility is illustrated when a person is requested to imagine a counterfactual event (e.g., 'imagine that you are holding something heavy in your hand'; Weitzenhoffer & Hilgard, 1962, p. 17), and to experience that the world and the self as if the case of that matter was real. In distinction, interrogative suggestibility or placebo effects are intended to persuade the person to believe that the world is in fact dissimilar than it truly is (Kirsch, 1997). This suggests a relationship between suggestibility and source monitoring (Johnson et al., 1993) as a hypnotic induction might encourage participants to believe in the external reality of a suggested experience without vivid imagination (Sheehan & McConkey, 1982).

There are two distinct types of suggestion that have been used in suggestibility studies: direct (primary) and indirect (secondary) suggestions. The first is known as 'outspokenly expressed' in which the intention to influence is overt; the second,

however, is 'masked' in which the intention to influence is concealed (e, g., Gheorghiu, 1989; Polczyk & Pasek, 2006).Polczyk and Pasek (2006) reported a positive correlation between the effects of both kind of suggestions, arguing that direct and indirect suggestibility did not need to be seen as independent processes.

Mintz and Alpert (1972), in a study in which schizophrenia patients were asked to listen to a stimulus that was not present (the popular recording 'White Christmas'), reported that those with hallucinations appeared to have highly vivid auditory imagery, compared to individuals without hallucination. Moreover, the three groups (schizophrenia patients with and without hallucinations and healthy control group) differed significantly in their ability to assess the accuracy of their auditory perceptions, with the hallucinating patients showing poorer ability than the non-hallucinating group, while the healthy controls showing better ability compared to both clinical groups.

Two studies have since examined the role of suggestion in eliciting hallucinatory experiences. First is the work by Young, Bentall, Slade and Dewey (1987) two experiments were carried out. In one experiment they recruited students according to their high and low scores on the predisposition to hallucination scale (LSHS-A), they then performed a couple of suggestibility measurements and also asked participants to close their eyes and "listen to" the tune 'White Christmas', a well-known song at the time (this suggestion procedure was based on earlier work by Barber and Calverley, 1963). The second experiment was identical to first apart from the target population in experiment 2 was psychiatric patients of mixed diagnoses. Both experiments revealed that subjects who were prone to hallucination and hallucinating patients were significantly more liable to hear the music when instructed to do so (for more details review Young et al., 1987).

A second study that also sheds light into the role of suggestion in hallucinations is a paper by Haddock, Slade and Bentall (1995) who tried to test the possible influence of suggestibility on verbal transformation on schizophrenia patients who did and did not experience hallucinations and healthy control participants. A well-researched auditory illusion, which had previously been studied in psychotic patients (Slade, 1976) is known as the verbal transformation effect: when the same nonsense word is repeated rapidly it is often perceived to change into an actual word or several words. Haddock et al. administered this procedure under two conditions: one in which participants were told there would be transformations and one in which they were told that the stimulus never changed even though it might seem to change from time to time. Compared to the controls, hallucinating patients reported more transformations when they were told they would occur and less when they were told that they would not occur.

These findings raise the possibility that hallucinating individuals may be more prone to suggestion effects (that is, have high trait suggestibility) than controls. A recent study showed that hallucination-prone subjects score higher than non-prone individuals on self-report measures of suggestibility (Barkus, Stirling & Cavill, 2010).

1.4.4 Dissociation and hallucinatory experiences

Dissociation has been described as a 'lack of integrated thoughts and feeling, disruption, and compartmentalization' (Eisen & Carlson, 1998) and is known to be a common consequence of traumatic experiences (Dalenberg et al., 2012). The Diagnostic and Statistical Manual of Mental Disorders 5th edition states that,

"Dissociative disorders are characterized by a disruption of and/or

discontinuity in the normal integration of consciousness, memory, identity,

perception, body representation, motor control, and behaviour", and that dissociative symptoms can potentially interrupt almost all part of psychological functioning (APA, 2013, p. 291).

Four subtypes are recognised: depersonalization, derealisation, amnesia and absorption. As a wide concept, dissociative tendencies lie on a continuum moving from the fairly benevolent signs of absorption frequently observed in non-clinical people (Glicksohn & Barrett, 2003: Mayer & Farmer, 2003), to extreme indications of depersonalization, to identity alteration and dissociative amnesia seen in individuals with dissociation disorders (Waller, Putman, & Carlson, 1996; Waller & Ross, 1997). Allen (1995) claimed that dissociative experiences as trauma-related syndromes can become severe symptoms of some psychological illnesses (e.g., dissociative disorder, posttraumatic stress disorder and severe stress disorder). Although dissociation is commonly considered as consequence of trauma, especially in childhood (Sanders & Giolas, 1991), it can be, however, experienced with no sign of any traumatic events (Mayer & Farmer, 2003). These experiences might be present in healthy individuals who could exhibit mild depersonalization and absorption (Ross, Joshi & Currie, 1991). When Eisen and Carlson (1998) examined college students, they found that absorption is the most common element of dissociation among them, arguing that this is due to the fact that it is the mildest subtype.

Numerous cross-sectional studies suggest an association between hallucination and dissociation, in healthy participants (e.g., Morrison & Peterson, 2003), as well as in individuals suffering from sexual abuse (e.g., Kilcommons, Morrison, Knight, & Lobban, 2008). A number of studies have also found strong associations between dissociative symptoms and auditory and visual hallucinations in patients with posttraumatic stress disorders (e.g., Kilcommons & Morrison, 2005). There has been

an evidence supporting that dissociation mediates the relationship between earlier traumatic experiences (childhood sexual abuse in particular) and subclinical psychotic experience (Anglin, Polanco-Roman & Lui, 2015; Cole, Newman-Taylor, & Kennedy, 2016; Varese et al., 2012) and hallucinatory experience in clinical and non-clinical individuals (Perona-Garcelan et al., 2012; Perona-Garcelan et al., 2014; Varese et al., 2012).

It seems likely that there is some kind of association between suggestibility and dissociative processes. A study by Giesbrecht, Lynn, Lilienfeld, and Merckelbach, (2008) reported that the high levels of both fantasy proneness and suggestibility can be detected in people with dissociative tendencies. A recent study by Terhune, Cardena and Lindgren (2011) also reported that non-clinical individuals who are highly dissociative and highly suggestible were more responsive to hallucination suggestions. These individuals, in turn, showed executive dysfunctioning and proneness towards psychopathology.

1.5 Aims and framework of the current thesis:

The overall aims of the thesis are twofold: first, to study the effect of suggestions and suggestibility on source monitoring ('signal detection' performance) in highly hallucination prone students and hallucinating patients. Second, to investigate the associations between suggestibility, dissociative experiences, childhood trauma and inner speech with hallucination/hallucination proneness. The thesis, moreover, aims to compare findings from samples of individuals in the UK and students and patients from Saudi Arabia, in terms of whether (i) source monitoring deficits and (ii) the associations between dissociative experiences, childhood trauma and inner speech with hallucination/hallucination proneness are cross-culturally valid.

This thesis expands on previous research that suggests, suggestions impact on hallucinatory experiences (e.g., Haddock et al., 1995); that there is a strong association between hallucinations and dissociative experiences and also between hallucinations and childhood trauma (e.g., Varese et al., 2011, 2012); and that dissociation mediates between trauma and hallucinations (e.g., Varese et al., 2012). The work also builds on previous findings that hallucinations are associated with certain qualities of inner speech (de Sousa et al., 2016). Only one chapter has been submitted for publication to date (Chapter 2) but the remaining four studies have been designed for eventual publication.

The main hypotheses tested in this thesis are; (i), that source monitoring performance as measured by a Signal Detection Theory (SDT) (Bentall & Slade, 1985; Varese, Barkus & Bentall, 2011) will be influenced by suggestions, leading to a more liberal response bias when it is suggested that there are a high number of target stimuli; (ii) that the effect of suggestion will be greater in people with high hallucination-proneness and patients who experience hallucinations. (iii) Given that patients sometimes experience hallucinations in the visual as well as the auditory modality, people with high hallucination proneness will show a liberal response bias in a SDT task in the visual modality and; (iv) therefore, that performance on the visual and auditory SDT tasks will be correlated.

A second set of hypotheses concerns the generalizability of existing findings to the culture of Saudi Arabia. Specifically, (v) that relevant questionnaire measures (of hallucination-proneness, suggestibility, dissociation and childhood trauma) are reliable when translated into Arabic; (vi) that the SDT abnormalities observed in American and European patients with hallucinations are also found in Saudi patients with hallucinations; and (vii) that the previously shown associations between

childhood trauma, dissociation and hallucinations, reported in European samples can be replicated in healthy and clinical samples in Saudi Arabia.

More specifically, the study presented in Chapter 2, first, investigated the association between hallucination proneness, dissociation, suggestibility while controlling for comorbidity, using a quite large sample of University of Liverpool undergraduate and postgraduate students (n= 414). The first objective was to examine whether these three variables are highly correlated, and whether both dissociation and trait suggestibility significantly predict hallucination proneness scores even when controlling for other symptom dimensions (i.e., paranoia). Second, the effect of suggestion on signal detection was also examined, using 60 participants from the 414 students; the objective here was to assess whether suggestions would lead to an increase in response bias in both highly hallucination-prone and low-prone participants, and if this increase would be more pronounced in highly hallucination-prone participants.

In Chapter 3, 61 participants from another screening of 418 undergraduate and postgraduate students of the University of Liverpool, which was the same online screening conducted for experiment 1 of study 1 presented in Chapter 2, the 61 students were recruited for the purpose of testing whether reality discrimination is modality specific. This was achieved by using both auditory signal detection (SDT) task, and visual task (which was developed specifically for this study.

In Chapter 4, 72 Saudi hallucinating and non-hallucinating psychotic patients were recruited. The objective of the study was to investigate the effects of suggestion on source monitoring (SDT) in hallucinating patients, using the same methods employed in our previous study (Chapter 2). Specifically, we hypothesised that (1)

indirect suggestions would have an impact on response bias scores in both hallucinating and non-hallucinating patients, and (2) this impact would be more pronounced in hallucinating patients. A second aim was to examine the relationship between self-report measure of trait suggestibility (IoS), and hallucinations in the same sample. We therefore, hypothesised that (3) there would be a close association between suggestibility and hallucination reports and that this association would remain robust and significant even when controlling for symptom dimensions that frequently covary with hallucinations, namely paranoid ideation and/or depressive symptom. Given that this study was conducted with patients in Saudi Arabia, a final aim was to establish the cross-cultural validity of previous findings linking source monitoring, suggestibility and hallucinations.

The study in Chapter 5, utilised a cross-sectional design and a university female students sample from Saudi Arabia (n= 131). The objective of the study was to carry out a preliminary investigation of the relationship between childhood trauma and psychosis-risk in a non-Anglo-American sample. Specific aims were: (1) to carry out a preliminary analysis of the reliabilities of suitable scales after translation into Arabic; (2) to investigate whether the association between childhood trauma and especially childhood sexual abuse and hallucinations holds for women living in Saudi Arabia; and (3) to investigate whether, in this sample, dissociation and inner speech qualities mediate the relationship between CSA and hallucinations.

The study in Chapter 6 involved the same 72 Saudi hallucinating and non-hallucinating patients. The objective of the study was to carry out a preliminary investigation of the relationship between childhood trauma and psychosis-risk in Saudi patients suffering from psychosis. Specifically, our aims were: (1) to investigate whether the association between childhood trauma and especially CSA and

hallucinations holds for psychotic patients living in Saudi Arabia; (2) to investigate whether, again in this sample, dissociation and inner speech qualities mediate the relationship between CSA and hallucinations.

Chapter 7, includes a general discussion summarizing the findings, and attempting to integrate them. This chapter discusses the clinical implications of the findings, and then proceeds to consider the merits and limitations of the research, and future research directions.

1.5.1 Co-author roles

Professor Graham Wagstaff was a co-author in Chapter 2. Professor Wagstaff helped in editing the suggestion section of the chapter and provided us with some very useful articles about suggestibility and proofread this chapter for publication. Dr Filippo Varese was a co-author in Chapters 2 and 3. Dr Varese helped also in editing the introduction section of both Chapters and provided statistical advice about the calculation of beta and d-prime for both auditory and visual SDT tasks in Chapter 3 and also proofread these chapters for publication. Dr Alexis Makin was a co-author in Chapter 3. Dr Makin provided assistance and guidance in designing the visual experiment.

Professor Richard Bentall provided guidance and helped in editing all Chapters of this thesis, with the manuscript write up and proofreading for publication. All control and clinical sample data were collected by myself, and the statistical analysis was also completed by myself under the supervision of Professor Richard Bentall. Accordingly, I am the primary author of the studies included in this thesis, and we have already published one study in the *Journal of Cognitive Neuropsychiatry* (Chapter 2), and we are also preparing other **4** studies for publications.

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Chapter 2

Suggestibility and source monitoring deficits in hallucination-prone university students[1]

2.1 Abstract

Introduction: Auditory hallucinations are associated with source monitoring biases and dissociation; suggestibility may also contribute to hallucinatory experiences. We examine the extent to which suggestions influence performance on a signal detection task in highly hallucination-prone and low hallucination-prone students, and also explore the relationship between suggestibility, dissociation and hallucination-proneness.

Methods: In two experiments, students completed on-line questionnaire measures of hallucination-proneness (the revised Launay-Slade Hallucination Scale), trait suggestibility (Inventory of Suggestibility) and dissociation (Dissociative Experiences Scale-II). Students who scored upper and lower tertiles of the LSHS-R performed an auditory signal detection task. Prior to task performance, suggestibility was experimentally manipulated by altering task instruction information pertaining to the number of expected targets presented in the task (Experiment 1, N= 60: high vs low suggestions; Experiment 2, N= 62, no suggestion vs high suggestion vs negative suggestion).

Results: Correlational and regression analyses on questionnaire data indicated that trait suggestibility and dissociation predicted hallucination proneness. Highly hallucination-prone students showed higher signal detection bias in both studies. In Experiment 1, both bias scores were significantly affected by suggestions to the same degree. In Experiment 2, we found that highly hallucination-prone students were more reactive to the high suggestion condition than the controls.

Conclusion: Suggestions may affect source monitoring judgments, and this effect may be greater in those who have a predisposition towards hallucinatory experiences.

2.2 Introduction

Hallucinations are frequently reported by patients with diagnoses in the schizophrenia spectrum (Bentall, 1990), and also by patients with other diagnoses such as bipolar disorder (Baethge et al., 2005). In clinical samples, these experiences are most often in the auditory modality and often cause considerable distress (Blom & Sommer, 2010; Ratcliff, Farhall, & Shawyer, 2011). However, general populations studies show that hallucinations are also experienced by a substantial minority of healthy people (e.g. Hanssen, Bak, Bijl, Vollebergh, & Os, 2005; Johns, Nazroo, Bebbington, & Kuipers, 2002; Ohayon, 2000).

Researchers have argued that hallucinations result from a failure of source monitoring (Bentall, 1990) the cognitive process involved in making attributions about the source of cognitive events (Johnson, Hashtroudi, & Lindsay, 1993). A number of methods have been used to assess source monitoring biases in highly hallucination-prone individuals, including source memory tasks, self-monitoring tasks and signal detection paradigms (Ditman & Kuperberg, 2005). Findings from these experimental studies, supported by a recent meta-analysis (Brookwell, Bentall, & Varese, 2013) are consistent with the hypothesis that patients who experience hallucinations, and also healthy participants with high hallucination predisposition, show a specific bias towards the misattribution of internally-generated cognitive events to sources other than the self (e.g. Beck & Rector, 2003; Bentall, Baker, & Havers, 1991; Bentall & Slade, 1985a; Choong, Hunter, & Woodruff, 2007; Morrison & Haddock, 1997; Rankin & O'Carroll, 1995; Varese, Barkus, & Bentall, 2011, 2012; Vercammen, De Haan, & Aleman, 2008).

Signal detection theory (SDT) was first used as a framework to examine source monitoring biases in relation to hallucination proneness by Bentall and Slade (1985),

and has since been used in many other studies (e.g. Barkus, Stirling, Hopkins, McKie, & Lewis, 2007; Varese et al., 2011, 2012). In a typical SDT task, participants listen to brief segments of white noise, some of which contain a voice (sometimes varying in loudness) and, after each trial, make a judgment about whether or not a voice was present. Behavioural data gathered through similar procedures are classified as hits, misses, correct rejections and false alarms, and can be used to generate measures of perceptual sensitivity (the inherent ability of an individual to detect "true" signals embedded in perceptual noise) and response bias (reflecting the individual's predisposition to respond that a signal has been presented). It can be argued that SDT tasks are an indirect way of assessing source monitoring because, in contrast to other paradigms, there is no direct measurement of self-to-other misattributions; the assumption is that an abnormal bias towards assuming that signals are present is associated with a greater likelihood of misattributing one's own thoughts to an external source. Nonetheless numerous studies have consistently found that hallucinating patients and highly hallucination-prone healthy participants, compared to appropriate controls, do not differ in perceptual sensitivity but show a greater bias towards detecting signals, resulting in a higher number of false alarms (e.g, Bentall & Slade, 1985; Varese et al., 2012).

In addition to source monitoring biases, some researcher have proposed that hallucinations might be associated with suggestibility. Early studies of hypnotic suggestibility found that some participants could be induced to report hallucinatory experiences following simple instructions (e.g. "close your eyes and listen to the record 'White Christmas'") even in the absence of a formal hypnotic induction procedure (Barber & Calverley, 1963; Spanos & Barber, 1974). This effect is more evident in psychotic patients who experience hallucinations (Mintz & Alpert, 1972;

Young, Bentall, Slade & Dewey, 1987) and in highly hallucination-prone healthy individuals (Young et al., 1987; Merckelbach & van de Ven, 2001; van de Ven & Merckelbach, 2003). Barkus, Stirling and Cavill (2010) also recently reported a positive association between self-reported suggestibility measured by Inventory of Suggestibility (IoS; Ordi & Miguel-Tobal, 1999) and positive schizotypy.

A complication when interpreting these findings is that suggestibility may be a multi-faceted construct. For example, the IoS, (Ordi & Miguel-Tobal, 1999) uses self-report items to measure what the authors construe as a number of different but correlated dimensions of suggestibility including fantasy proneness, absorption, emotional suggestibility and influence from others. Others have argued that a distinction can be made between primary or direct and secondary or indirect suggestions; with the former, the suggestion is outspokenly expressed with an overt intention to influence others whereas, in the latter, the suggestion is indirect or 'masked' so that the intention to influence is concealed (e.g., Gheorghiu, 1989; Polczyk & Pasek, 2006).

Most studies of hypnotic suggestibility have used direct or primary suggestions for motoric actions (e.g. that arms will levitate) or sensory experiences (e.g., that the record 'White Christmas' is about to be played). By contrast, a study by Haddock, Slade and Bentall (1995) examined hallucinating patient's responses to indirect suggestions. The primary aim of the study was to assess hallucinating patients, non-hallucinating patients and healthy controls for their sensitivity to the verbal transformation effect (VTE), a phenomenon in which a word that is repeatedly presented (in this study, the nonsense word "tress") appears to change into other words (Warren, 1968); previous studies had reported that a high number of transformations may be associated with hallucination proneness (Slade, 1976).

Haddock et al. (1995) assessed the VTE under two conditions: one in which the participants were accurately instructed that the word never changed, and the other in which they were told that it would change. Hallucinating patients, compared to both control groups, reported more transformations in the latter condition but fewer transformations when they were told that the word did not change. Although interpreted as evidence that previously reported VTE abnormalities were the consequence of experimental demands, this finding indicates that hallucinating patients' judgments about their own perceptions are highly sensitive to indirect suggestions.

Numerous studies have reported that early life trauma, particularly sexual abuse, is a risk factor for psychosis in general (Varese et al., 2012) and hallucinations in particular (Bentall, Wickham, Shevlin, & Varese, 2012; Hammersley et al., 2003; Shevlin et al., 2011; Sitko, Bentall, Shevlin, O'Sullivan, & Sellwood. 2014). This has prompted research in the role of dissociation, defined as "a disruption of and/or discontinuity in the normal, subjective integration of one or more aspects of psychological functioning, including—but not limited to—memory, identity, consciousness, perception, and motor control" (Spiegel et al., 2011), which is a well-documented and common consequence of early life trauma (Dalenberg et al., 2012). Studies have reported strong associations between dissociative experiences and predisposition to hallucinations in non-clinical samples (e.g. Morrison & Petersen, 2003; Perona-Garcelán et al., 2013), in patients with post-traumatic stress disorder (e, g., Kilcommons & Morrison, 2005; Kilcommons, Morrison, Knight, & Lobban, 2008) and also in psychotic patients (Perona-Garcelán et al., 2008), as confirmed by a recent meta-analysis of this literature (Piton, Varese, Berry & Bucci, 2015). Two studies with psychotic patients also found that dissociation mediated the relationship between

childhood trauma and hallucinations (Perona-Garcelán et al., 2012; Varese et al, 2012).

In disentangling the mechanisms that lead to hallucination, a complication is that dissociation and suggestibility may be highly related or even overlapping phenomena with some researchers suggesting that dissociation may lead to increased suggestibility (Eisen & Carlson, 1998). However, others propose that suggestibility and dissociation are distinct concepts (Cardena & Spiegel, 1991), a proposal which has found some empirical corroboration. For instance, Barkus et al. (2010) reported that suggestibility and dissociation independently contributed to positive schizotypy in a student sample. Moreover, a recent study by Terhune, Cardena and Lindgren (2011), also with student participants, reported that individuals who are highly dissociative and highly suggestible (to imaginative suggestions generally) were more responsive to hallucination suggestion, but those who were highly suggestible without scoring high on dissociation were not.

Our study has two main goals: First we aimed to assess the impact of indirect suggestion on source monitoring performance in highly hallucination-prone and low hallucination-prone individuals. Specifically, we hypothesised that 1) Indirect suggestions would lead to an increase in response bias in both highly hallucination-prone and low-prone participants, and 2) That this increase would be more pronounced in highly hallucination-prone participants. Our second goal was to examine the relationships between self-report measures trait suggestibility, dissociation and hallucination-proneness (LSHS-R). Based on previous studies (e.g. Barkus et al, 2010), we hypotheses that: 3) These three variables will be highly inter-correlated; 4) Both dissociation and trait suggestibility will significantly predict hallucination-proneness scores in regression analyses; 5) These associations will

remain robust and significant even when controlling for symptom dimensions that frequently covary with hallucination-proneness, namely paranoid ideation (PaDSp). In order to further establish the specificity of the relationships between psychological variables and hallucination-proneness, the same analysis will be repeated with paranoia (PaDSp) when controlling for LSHS-R.

2.3 Experiment 1

2.3. 1 Method

2.3.1.1 Participants

A two-phase design was used. Phase 1 involved the recruitment of a large sample of students from University of Liverpool ($N = 414$, aged 18-53 years, $M_{age} = 21.22$ and $SD = 4.13$; 23.4% male). They were screened using on-line questionnaire measures, including measures of hallucination-proneness (the revised Launay-Slade Hallucination Scale; LSHS-R), and were invited to have their names included in a lottery for a prize of £100. (In 2014/15 the university had 22,715 registered students.)

In Phase 2, we recruited 60 participants from Phase 1(ages 18-32, $M_{age} = 21.32$ and $SD = 3.38$; 30% male) who had consented to be contacted about further lab-based research, and who scored in the upper third (scores => 34, N = 31) or lower third (scores < = 25, N = 29) of the distribution of LSHS-R scores. All participants in Phase 2 completed the LSHS-R but one participant in each group had data missing for the other questionnaire measures (see Table 2.2). There was no difference between the high and low hallucination proneness groups for age, $t(1, 58) = .55$, $p = .59$, or gender composition $\chi^2(1, N= 60) = .54$, $p = .58$.

Bentall and Slade (1985) obtained significant differences between participants using just 10 high LSHS-scoring and 10 low LSHS-scoring participants per group,

with an effect size of 1.53 for beta scores. However, in Brockwell et al's (2013) meta-analysis, the mean effect size for comparing low and high hallucination-prone students was 0.80 over 9 studies. Using this last value, G*power software estimates that a minimum sample size of 21 per group is required to detect a group difference at $p < .05$. There were no missing values from the participants.

2.3.1.2 Measures

2.3.1.2.1 The revised Launay-Slade Hallucination Scale (LSHS-R; Bentall & Slade, 1985b), the LSHS-R comprises 12 statements describing clinical ("I often hear a voice speaking my thoughts out aloud") and sub-clinical ("The people in my daydreams seem to true to life that I sometimes think they are") auditory and visual hallucinatory experiences scored on 5-point Likert scales (anchors: "certainly does not apply to me" – "certainly applies to me"). Scores range from 12 to 60; higher scores represent increased proneness to hallucinations. The scale has excellent internal consistency (e.g. $\alpha = .82$; Varese et al. 2011) and $\alpha = .78$ in our first experiment and $= .80$ in the second experiment.

2.3.1.2.2 The persecution subscale of the Persecution and Deservedness Scale (PaDSp; Melo, et al., 2009), the PaDSp is a 10-item self-report measure including statements with persecutory content which participants are required to rate on 5-point Likert scales; scores range from 0 to 40. An α coefficient for the scale of .87 was reported by Varese et al. (2011) and $\alpha = .88$ in our first experiment and $= .87$ in the second experiment.

2.3.1.2.3 The Dissociative Experience Scale-II (DES-II; Carlson & Putnam, 1993), the DES-II is a 28-item, self-report measure assessing the frequency of clinical and non-clinical dissociative phenomena, rated between 0 to 100; Scores range from 0

to 2800. The scale has reported α coefficient of .95 (Bernstein, Putnam & Ross, 1993); α = .94 in both the first and second experiments.

2.3.1.2.4 The Inventory of Suggestibility (IoS; Ordi & Miguel-Tobal, 1999), the IoS is a 22-item assessment of trait suggestibility, rated on 5-point Likert scales with scores range from 0 to 88. Barkus et al. (2010) used an English translation of the scale with a sample of 230 students and university staff and reported a total score α coefficient of 0.82; α = .83 in our first experiment and = .78 in the second experiment.

2.3.1.2.5 Auditory signal detection task (SDT; Barkus et al., 2007), participants were asked to perform two runs, one in a low-suggestion condition, and one in a high-suggestion condition. The task consists of one 8-min block of sixty 8-s trials. Each consists of one 5-s burst of white noise followed by 3-s of silence. During 60% of trials, a 1-s voice is present during the white noise. A third of the time the voice is clearly audible; in the remaining trials the voices are harder to detect. Stimuli were present through stereo headphones. After each trial, participants were requested to indicate whether they perceived a voice by pressing mouse buttons labelled 'yes' or 'no' using their preferred hand (Barkus et al., 2007). A two-minute practice run was provided. In the event of no response, a no-detection response was recorded (this happened only rarely).

We calculated estimates of perceptual sensitivity (d`), and response bias (β), (which are standard measures used to analyse signal detection data; McNichol, 1972) based on computational methods described by Barkus et al. (2007). Perceptual sensitivity refers to the accuracy in detecting true signals; a d` value of zero indicates a complete failure to distinguish between signals and background noise whereas higher d` scores indicate increasingly better ability to perceive true signals. β scores

assess response bias – in effect, the individual's tendency to assume a signal is present under conditions of uncertainty. The lower the β score the greater the participant's bias towards assuming that signal are present as reflected in higher rates of correct detections and false alarms.

2.3.1.3 Procedure

In Phase 1, an email invitation was sent to students at the University of Liverpool with a hyperlink to a web-based questionnaire that included a demographic data sheet and the LSHS-R, PaDSp, DES-II and IoS. Participants were asked to provide an email address and/or telephone number if they wanted to be entered into a lottery prize draw, and were also asked whether they would like to be contacted for a lab-based follow-up experiment.

In Phase 2, the 60 participants performed the two runs of the auditory signal detection task, and were alternatively assigned to either high suggestion or low suggestions first in the order in which they responded to the experimenter's contact (the first person was assigned to low first, the second to high first, the third to low first and so on). In the high suggestion condition, instructions included:

> *"The voices are present on 80% of occasions but some of them are very quiet, and your job is to try to identify these voices."*

In the low suggestion condition the instructions included:

> *"The voices are present on 30% of occasions, and your job is to try to identify these voices."*

Participants were completely debriefed afterwards. The experiment was approved by the IPHS Research Ethics Committee, at University of Liverpool (reference no. PSYC-1213-SG-30).

2.3.2 Results

2.3.2.1 Correlational analysis of self-report measurements of Phase 1

The questionnaire measures were highly correlated (Table 2.1). Hallucination proneness was significantly associated with dissociation ($r = .44$, $p < .001$) and trait suggestibility ($r = .39$, $p < .001$) when controlling for paranoid ideation in partial correlation analyses. Paranoia correlated with DES-II scores ($r = .33$, $p < .001$) and IoS scores ($r = .33$, $p < .001$) when hallucination proneness was controlled for.

Table 2.1

Correlation matrix of questionnaire variables (N = 414), Experiment 1 - Phase 1.

	LSHS-R	DES-II	IoS
DES-II	.58	--	--
	(*p*< .001)		
IoS	.54	.51	--
	(*p*< .001)	(*p*< .001)	
PaDSp	.46	.50	.50
	(*p*< .001)	(*p*< .001)	(*p*< .001)

We carried out a hierarchical multiple regression with PaDSp, DES-II and IoS scores as predictors of hallucination proneness. The residuals scatterplot and normality plot revealed that the assumption of linearity and multivariate normality had been met and there was no evidence of possible outliers in the dataset. VIF values were between 1.51 and 1.55, indicating that there was no multicollinearity problem. In the first step, with only paranoia scores included, 21% of the variance in LSHS-R

scores was accounted for $F(1,380) = 103.75$, $p < .001$. In the second step, DES-II and IoS scores were added to the model, resulting in an increase in the variance accounted for to 41%, $F(2,378) = 65.80$, $p < .001$, resulting again in a significant model, $F(3,378) = 90.25$, $p < .001$. Both DES-II scores ($\beta = .36$, $t = 7.35$, $p < .001$) and IoS scores ($\beta = .27$, $t = 5.66$, $p < .001$) significantly predicted hallucination-proneness.

However, when the regressions were recalculated with paranoia as the dependent variable and controlling for hallucinations at the first step (VIF values 1.53 – 1.70), a very similar pattern of results were observed with a significant final model, $F(3,378) = 66.67$, $p < .001$, and with both DES-II scores, $\beta = .27$, $t = 5.07$, $p < .001$, and IoS scores, $\beta = .27$, $t = 5.20$, $p < .001$, predicting paranoia. Hence, in this study, the effects of DES-II and IoS scores were not specific to the type of psychotic experience reported. Examination of the specific subscales failed to illuminate this issue (for example, in analyses of the data not reported here, we found that DES-II absorption correlated more highly with IoS fantasy and daydreaming than with IoS absorption and that, in a regression model, DES-II absorption failed to predict LSHS-R scores whereas IoS absorption did).

2.3.2.2 Between-group and within-group differences in source monitoring performance and self-report measures in Phase 2 data

Group scores on the four questionnaires are shown in Table 2.2; t -tests indicated that highly hallucination-prone participants presented significantly higher DES-II, LSHS-R, IoS and PaDSp scores compared to low-prone participants (*p* at least < .005).

Table 2.2

Descriptive Statistics of the four questionnaires measures for the two groups in Experiment 1. LSHS-R= hallucination-proneness scale, DES-II= Dissociative Experience Scale, IoS= Inventory of Suggestibility, PaDSp= Persecution subscale of Persecution and Deservedness Scale.

Groups		LSHS-R	DES-II	IoS	PaDSp
High LSHS-R	M	38.58	25.63	49.83	18.00
	SD	4.60	17.23	13.59	10.47
	N	31	30	30	28
Low LSHS-R	M	19.86	9.55	34.55	9.14
	SD	3.56	6.72	8.89	6.83
	N	29	29	29	29

Summary data for the signal detection scores are shown in Table 2.3 and Figure 1. Mixed-model ANOVAs were calculated with β scores (response bias) and *d'* scores (perceptual sensitivity) as dependent variables, with suggestion condition as a within-subject variable and with hallucination proneness (high vs. low) and order of conditions (low suggestion first vs. high suggestion first) as between-subjects variables; using PaDSp scores as a covariate in the analyses.

For β scores, when, controlling for the effect of paranoia which was non-significant, $F(1, 52) = 1.36$, $p = .249$, partial $\eta^2 = .03$, there was a significant main effect of suggestion on β, $F(1, 52) = 4.79$, $p < .05$, partial $\eta^2 = .08$, indicating that the suggestions had the predicted influence on the participants' performances. There was

also a significant main effect for hallucination proneness, $F(1, 52) = 6.29$, $p < .05$, partial $\eta^2 = .11$, indicating that highly hallucination-prone participants had significantly lower bias scores. The interaction between suggestion and hallucination proneness was not significant $F(1, 52) = 0.60$, $p = .443$, partial $\eta^2 = .01$, revealing that there is no difference between groups' performances. The effect for the order of suggestion was significant, $F(1, 52) = 4.28$, $p < .05$, partial $\eta^2 = .08$ but the interaction between the order of suggestion and groups was not significant, $F(1, 52) = 0.03$, $p = .854$, partial $\eta^2 = .00$.

In a supplementary analysis, we repeated the ANOVA using false alarm scores, and obtained a significant main effect for groups, $F(1.56) = 5.54$, $p < .05$, but the main effect for condition was not significant, $F(1.56) = 1.86$, $p = .18$.

We computed a *Beta*-change score as the difference between β in the low suggestion condition and β in the high suggestion condition. This score, which is a behaviour index of actual response to suggestions, did not correlate with either trait suggestibility (IoS scores; $r = -.04$, $p = .74$), or with dissociation (DES-II scores; $r = -.15$, $p = .27$).

When the analysis was carried out on the d' scores, also controlling for the effect of paranoia which was non-significant, $F(1, 52) = 0.98$, $p = .326$, partial $\eta^2 = .02.$, there was no significant main effect for suggestion on d' scores, hallucination proneness, order of suggestions, or for their interactions.

Table 2.3

Descriptive statistics for β scores, d' and False Alarms scores for the two groups in Experiment 1.

Groups		High-suggestion			Low-suggestion		
		FA	β	d'	FA	B	d'
High LSHS-R	M	8.26	0.02	1.15	6.19	0.26	0.96
	SD	5.20	0.28	0.70	5.44	0.28	0.97
Low LSHS-R	M	6.10	0.31	1.36	3.31	0.46	1.31
	SD	5.80	0.48	0.86	3.40	0.36	0.72

Note: β = response bias, d' = perceptual sensitivity and FA = false alarms

2.3.3 Discussion

Consistent with previous findings, highly hallucination-prone participants had lower β scores (i.e. greater bias) than low-prone controls. Suggestions affected source monitoring (SDT) performance in both highly hallucination-prone and low-hallucination-prone students equally. This was contrary to expectation, as we had hypothesised that highly hallucination-prone individuals would be more suggestible than the low hallucination-prone participants.

An important limitation of the first experiment, which we sought to address, was that the participants received indirect suggestions about the number of stimuli to be expected in both conditions; in the 30% condition we informed the participants that there were less stimuli than there actually were. It is possible that the absence of a no suggestion condition may have limited our ability to detect finer between-group differences. In Experiment 2, therefore, we included a condition in which no specific suggestions were given, and also one that included the suggestion that there might be

no voices whatsoever (which would be a negative hallucination suggestion analogous to the no transformation suggestion given by Haddock et al., 1995).

Figure 2.1

β scores with the association to hallucination proneness and suggestion conditions in Experiment 1.
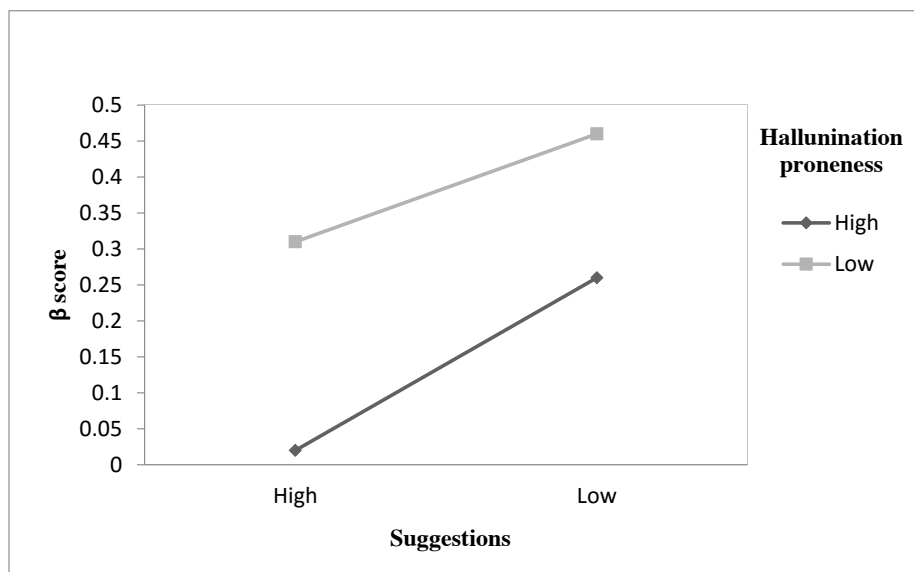
2.4 Experiment 2

2.4.1 Method

2.4.1.1 Participants

The design was similar to Experiment 1. In Phase 1, 321 students were recruited (age 17 - 51, $M_{age} = 22.38$, $SD = 5.20$, 39.3% male). Sixty-two participants scoring in the upper and lower tertile of LSHS-R scores were recruited for Phase 2 (aged 18 - 37, $M_{age} = 21.06$, $SD = 3.09$; 25.8% male); names were checked to ensure

that these participants had not participated in Experiment 1. The researcher made also

sure that the LSHS-R was answered by all students who took part in Phase 2; some of

the remaining questionnaires were not completed (see Table 2.5) and, when the

relevant questionnaire scores were used in correlational analyses a listwise deletion

approach was used. There was no difference in age between the high and low

hallucination proneness groups, $t(1, 60) = 1.75$, $p = .08$, and the groups were

equivalent for gender composition $\chi^2(1, N= 62) =.337$, $p = .772$.

2.4.1.2 Measures

The same four questionnaires were used; SDT task was also used with three

suggestion conditions (see procedure).

2.4.1.3 Procedure

In Phase 2, participants performed three runs of the auditory signal detection

task following three distinct manipulation of suggestibility ("no suggestion",

"negative suggestion" and "high suggestion"). The order of presentation was

counterbalanced with the exception that the no suggestion condition always occurred

first (to prevent any influence from previously presented suggestions).

The no suggestion run instructions included:

> *On this version, the voice will be present on some of occasions, but it will*
> *sometimes be very quiet.*

The high suggestion run instructions included:

> *On this version, the voice will be present on 70% of occasions, but it will*
> *sometimes be very hard to hear.*

The negative suggestion run instructions included:

O*n this version of the task, there will be no voice present, but some people*

occasionally think that they hear voices in these circumstances, which is

perfectly normal, and we would like you to tell us if this happens to you.

Afterwards, participants were completely debriefed, and the hypotheses and
the theoretical background of the study were fully disclosed. The experiment was
approved by the IPHS Research Ethics Committee, at University of Liverpool
(reference no. IPHS-1314-LB-188).

2.4.2 Results

2.4.2.1 Correlational analysis of self-report measurements of Phase 1

All the questionnaire scores in Phase 1 were strongly associated with each
other (Table 2.4). Hallucination proneness was significantly associated with
dissociative tendencies (Pearson $r = .50$, p < .001) and suggestibility ($r = .48$, $p <$
.001) when controlling for paranoid ideation. Paranoia correlated with quite similar
magnitudes with DES-II scores ($r = .31$, $p < .001$) and IoS scores ($r = .17$, $p < .05$)
when hallucination proneness was controlled for. On regression analysis controlling
for co-occurrence between hallucinations and paranoia (VIF 1-36 – 1.58), the pattern
of association for hallucinations was very similar to that observed in Experiment 1,
$F(3,299) = 84.07$, $p < .001$, and with both DES-II scores, $\beta = .40$, t = 7.63, $p < .001$,
and IoS scores, $\beta = .28$, t = 5.68, $p < .001$, predicting hallucinations. However, a slight
different result was obtained when paranoia was the dependent variable (VIF = 1.49-
1.80), $F(3,299) = 39.28$, $p < .001$, with only DES-II scores retained as a significant
predictor, $\beta = .33$, t = 5.13, $p < .001$.

Table 2.4

Correlation matrix for questionnaire variables (N = 321), Experiment 2 - Phase 1.

	LSHS-R	DES-II	IoS
DES-II	.61 (p< .001)	--	--
IoS	.53 (p< .001)	.48 (p< .001)	--
PaDSp	.44 (p< .001)	.49 (p< .001)	.36 (p< .001)

2.4.2.2 Between-group and within-group differences in source monitoring and suggestibility

Group comparisons on the questionnaires are shown in Table 2.5 and summary data for the signal detection measures are given in Table 2.6. As in Experiment 1, all of the differences on the questionnaire scores were statistically significant. When a mixed-model ANOVA was run on the β scores (response bias), when controlling for the effect of paranoia, which was non-significant, $F(1, 55) =$ 1.13, $p = .293$, partial $\eta^2 = .02$, there was a significant main effect of suggestion on β, $F(2, 110) = 5.42$, $p < .01$, partial $\eta^2 = .10$, indicating that the suggestions had the predicted influence on the participants' performances. A significant main effect for hallucination proneness was again found, $F(1, 55) = 9.93$, $p < .01$, partial $\eta^2 = .15$, indicating that highly hallucination-prone participants had significantly lower bias scores. The interaction between suggestion and hallucination proneness was significant $F(2, 110) = 3.62$, $p < .05$, partial $\eta^2 = .06$, revealing that there is a

difference between groups' performances. The effect of the order of suggestion was not significant, $F(1, 55) = 1.88$, $p = .176$, partial $\eta^2 = .03$. . The interaction between the order of suggestion and groups was also not significant, $F(1, 55) = 0.35$, $p = .556$, partial $\eta^2 = .01$.

Comparable results were obtained when false alarm scores were analysed: there were significant effects for group, $F(1,58) = 13.01$, $p < .001$, condition, $F(2,116) = 19.26$, $p < .001$, and for the group x condition interaction, $F(2,116) = 4.91$, $p < .01$.

Table 2.5

Descriptive Statistics of the four questionnaires measures for the two groups in Experiment 2. LSHS-R= hallucination-proneness scale, DES-II= Dissociative Experience Scale, IoS= Inventory of Suggestibility, PaDSp = Persecution and Deservedness Scale.

Groups		LSHS-R	DES-II	IoS	PaDSp
	M	38.58	30.39	50.26	17.77
High LSHS-R	SD	4.29	16.45	6.99	9.20
	N	31	28	31	31
	M	21.48	10.41	37.32	9.90
Low LSHS-R	SD	2.57	8.70	7.69	7.69
	N	31	29	31	29

When examine the source of this interaction, we inspected the confidence intervals for the scores of each group in each condition. These revealed that, in the low-hallucination prone group, the β values in the no suggestion condition (.479 - .693) were lower than in the negative suggestion condition (.697 - .925); the scores on the high suggestion condition fell between those on the other two conditions but did not significantly differ from either (.537 - .779).

In the highly hallucination prone students, scores on the no suggestion condition (.291 - .506) were significantly lower than those in the negative suggestion condition (.519 - .747), scores in the high suggestion condition (1.49 - .391) differed from those in the negative suggestion condition but not those in the no suggestion condition.

Comparing across the groups, the only significant difference was observed in the high suggestion condition, indicating that the highly hallucination prone students had a greater response to the high suggestion condition.

When the same analysis was carried out on the d' scores, also controlling for the effect of paranoia which was non-significant, $F(1, 55) = 0.18$, $p = .672$, partial η^2 = .00. There was no significant main effect for suggestion on d' scores, hallucination proneness, order of suggestions, or for their interaction.

Table 2.6

Descriptive Statistics of β scores, d' and False Alarms scores for the two groups in Experiment 2.

Groups			No Suggestion		High-suggestion			Negative suggestion		
		FA	β	d'	FA	B	d'	FA	β	d'
High LSHS	M	3.55	0.40	1.51	4.90	0.27	1.55	1.97	0.63	1.75
	SD	2.74	0.35	0.38	4.61	0.36	0.61	2.55	0.38	0.56
Low LSHS	M	1.96	0.59	1.64	1.71	0.68	1.85	0.71	0.82	1.83
	SD	1.45	0.24	0.39	1.94	0.32	0.52	0.98	0.23	0.57

Note: β = response bias, d' = perceptual sensitivity and FA = false alarms

2.4.3 Discussion

Experiment 2 replicated the findings from Experiment 1, with the additional observation that the highly hallucination-prone students appeared to be more affected by the high suggestion condition.

Figure 2.2

β scores with the association to hallucination proneness and suggestion conditions in Experiment 2.
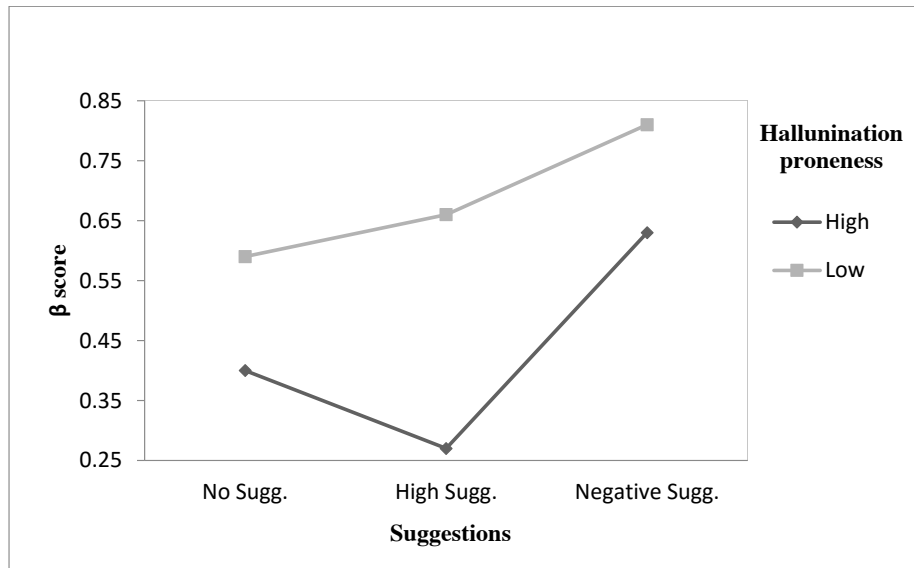
2.5 General discussion

Bentall (1990), in a theoretical review of the literature on hallucinations, argued that they occur when individuals misattribute inner mental experiences to an external source and that, therefore, a failure in source monitoring is the central cognitive mechanism responsible for this kind of experience. This general account has been supported by a wide range of studies that have empirically tested source

monitoring in highly hallucination-prone and low hallucination-prone individuals, using both clinical and non-clinical samples (Brookwell et al., 2013). However, Bentall's (1990) theory also drew attention to both contextual and psychological factors that influenced source monitoring judgments, which may be important in determining whether and when hallucinations occur. Beliefs and expectations about experiences were discussed as a relevant psychological factor in the original account, and an obvious implication is that suggestions that effect such beliefs and expectations will impact on source monitoring performance. Although dissociation was not discussed in the original model, it is not difficult to see how the failure to attend to immediate circumstances, which is perhaps the core feature of dissociation, might also impact on source monitoring.

In both studies, data from questionnaire phases revealed that suggestibility and dissociative experiences were strongly correlated with each other and that both predicted hallucination-proneness after controlling for paranoia in our regression analyses. These results are consistent with those of Barkus et al. (2010). However, an important caveat is that very similar results were obtained when the questionnaire measures were used to predict paranoia, even when controlling for hallucinations (the exception was that, in Experiment 2, dissociation and not suggestibility was retained as a predictor of paranoia).

Studies with both non-clinical (Morrison & Petersen, 2003; Varese et al., 2011) and clinical samples (Perona-Garcelán et al., 2012; Varese et al., 2012) have specifically implicated dissociation in hallucinatory experiences whereas the effects found in this study were not specific. Several features of the present study may have made it difficult for us to detect such specificities. First, dissociation and suggestibility are multifaceted experiences, which are highly correlated in most

samples (Eisen & Carlson, 1998). As the two scale scores were highly correlated in both of the present samples it is possible that they tap common psychological processes and, indeed, both can be broken into subscales which, in both cases, include a subscale for absorption. Second, it is possible that both dissociation and suggestion effects are not trait-like but change moment to moment. For example, in a previous experience sampling study with a clinical sample, found that the onset of dissociative experiences predicted the onset of hallucinations (Varese et al., 2011). In the present investigation we investigated the immediate impact of suggestion effects by actually presenting suggestions prior to a source monitoring task.

In both studies, groups' performance differed on β but not d', replicating other studies with both clinical non-clinical samples (see introduction and also meta-analysis by Brookwell et al., 2013). However, the primary aim of the present investigation was to determine whether the source monitoring performance of highly hallucination-prone individuals was affected by suggestions. As expected, a robust effect of suggestions on SDT β scores was observed in both Experiments. In Experiment 1, this effect was found for both groups; however, the absence of a negative suggestion condition limited our ability to determine whether the high and low hallucination prone groups had responded equivalently to the different suggestions. Moreover, it was not clear whether either or both groups actually interpreted or calibrated the supposed low (30%) suggestion in Experiment 1 as (what is termed in the suggestion literature) a negative hallucination suggestion; i.e. a suggestion to 'not hear' what is actually present (Spanos, Burgess, Cross & Macleod, 1992). When a more obvious negative hallucination suggestion was introduced in Experiment 2, results indicated that the two groups responded differently: in particular, high hallucination prone participants responded more to the high

suggestion; i.e. the positive hallucination suggestion. Examining the direction of the

β score means in relation to the no suggestion condition in Experiment 2, there is no

evidence that low hallucination-prone participants were influenced at all by the high

suggestion. Importantly, there was also no evidence that these effects were influenced

by either paranoia as measured by PaDSp scores or the order of suggestion

presentation.

Overall, the findings of the two studies support Bentall's (1990) account of

hallucinations by showing that source monitoring judgments are sensitive to

suggestions. One way of interpreting the findings in Experiment 2 might be to argue

that high hallucination prone individuals are more likely to respond to suggestions

that most obviously concur with, or endorse, their self-reported predilections to 'see

and hear things that are not there'. In other words, relative to low hallucination prone

individuals, high hallucination prone students are more likely to be influenced by

suggestions for positive hallucinations than negative hallucinations. This would fit

with other studies that have shown an association between measures of hallucination

proneness and suggestions that directly or indirectly encourage false positive

responses (for example, Haddock et al., 1995: Merckelbach & van de Ven, 2001; van

de Ven & Merckelbach, 2003; Young et al., 1987). However, these results do not

provide any evidence to support the hypothesis that high hallucination prone

individuals are more susceptible to suggestions in all circumstances than low

hallucination prone individuals; indeed, if they were more susceptible to suggestions

in general, they should have shown a greater shift towards higher β responses than

low hallucination prone individuals in the negative suggestion condition.

Taken together, the results appear to indicate that, whilst the kind of

questionnaire self-report global suggestibility measures such as the IoS seem to

correlate reliably with reports of hallucination proneness in student samples, the responses of highly hallucination prone people to the administration of more specific suggestions involving perceptual and sensory alterations may vary according to the nature and direction of the suggested experiences. Nevertheless, the present findings may potentially have important implications. For instance, if highly hallucination prone individuals have impaired source monitoring under ordinary circumstances, then, arguably, the addition of suggestions that promote or encourage false positive responses may be sufficient to elicit a full blown hallucinatory experience. Moreover, this effect will clearly be exacerbated if the individuals with impaired source monitoring are particularly receptive to suggestions of this kind as the current findings imply.

These experiments have some methodological limitations that should be mentioned. The main limitation is that the participants recruited for this investigation were students selected according to their scores on questionnaires, rather than psychiatric patients. It has been observed that healthy people who score highly on the LSHS-R often fail to report hallucinatory experiences comparable to those of patients when questioned in more detail (Stanghellini, Langer, Ambrosini, & Cangas, 2012). However, the hypothesis of a psychosis continuum does not necessarily require that such experiences will be comparable. More importantly, there is a rich literature of studies reporting similar result on a variety of psychological measures for high LSHS-R scoring individuals and hallucinating patients; indeed this is the case for signal detection and source-monitoring studies (e.g., Bentall & Slade, 1985; Varese et al., 2012) as confirmed in a meta-analysis that considered both types of studies (Brookwell et al., 2013). Other limitations concern the limited ability of the DES-II and IoS to tap distinct psychological processes, as already noted, and also the

possibility that other types of experimental suggestions might conceivably have effects that were not detected in this research. Moreover, The present samples for both experiments were relatively modest in size, and based on a convenience sample that allows the possibility of a bias in referral to the study and limiting the generalizability and statistical power of the findings. In terms of clinical implications, it is possible that suggestibility effects could be exploited to facilitate the development of more efficient cognitive-behavioural interventions with patients suffering from hallucinations. For example, there has been a long tradition within psychotherapy research of viewing the suggestion of optimistic/better outcomes as a crucial element common to different kinds of therapy (Frank & Frank, 1991). However, suggestions might conceivably have negative effects, and a patient who is highly suggestible may be vulnerable to any pessimistic suggestion inadvertently made by an unskilled therapist. It is possible that some kinds of therapy may therefore be safer for patients who are at risk of this kind of negative effect. The approach of compassion-focused therapy as developed by Gilbert, (2009) for example aims to promote feelings of contentment, safeness and warmth in relationships with others and, more importantly, self-compassion and acceptance towards the self, which might be protective against negative cues from others.

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Chapter 3

Auditory and visual signal detection in hallucination-prone students

3.1 Abstract

Introduction: Auditory hallucinations are associated with reality discrimination difficulties, as evidence by lower response bias scores in auditory signal detection tasks. However, the specificity of this difficulties to the auditory modality has not been studied. We examined signal detection performance on both auditory and visual tasks in high hallucination prone and low hallucination prone participants.

Methods: After screening 418 students on the Launay-Slade Hallucination Scale (LSHS-R), 61 students who scored in the upper and lower tertiles of the LSHS-R were tested using an auditory signal detection task (SDT) and an analogue visual task.

Results: Hallucination-prone participants had significantly lower response bias scores than the non -prone participants in both modalities. Correlational analyses revealed that auditory response bias and perceptual sensitivity scores were strongly and positively associated with equivalent scores from the visual SDT.

Conclusion: Both visual and auditory signal detection was biased in the high hallucination prone group, raising the possibility of a common mechanism.

3.2 Introduction

Hallucinatory experiences are common amongst patients with severe psychiatric diagnoses such as 'schizophrenia' (Baethge et al., 2005; Loue & Sajatovic, 2008). However, these experiences also reported by a substantial minority of individuals in non-clinical samples. For example, a general population survey in England and Wales estimated that 4% had experienced hallucinations in the form of hearing voices or seeing things (Johns, Nazroo, Bebbington & Kuipers, 2002).

Auditory hallucinations are generally regarded as the most prevalent and troubling type of hallucinations experienced by adults with mental health difficulties (Blom & Sommer, 2010; Hanssen, Bak, Bijl, Vollebergh & Os, 2005; Ohayon, 2000; Ratcliff, Farhall & Shawyer, 2011), but hallucinatory experiences in other sensory modalities are also common. For example, in the US Epidemiologic Catchment Area (ECA) study, the lifetime prevalence was estimated to be 11.1-13%, with a higher rate for visual than for auditory hallucinations (Tien, 1991). A more recent epidemiological study in the US found that visual and auditory hallucinations are approximately equally prevalent in the general population (Shevlin, Dorahy, & Adamson, 2007).

Visual hallucinations are most prevalent during early psychosis (affecting about a third of the patients, and usually consisting of a human-like figure) and then become less frequent with time and intervention, perhaps explaining why they are less prevalent than auditory hallucination in unselected clinical samples (Dudley, Collerton, Nicholson & Mosimann, 2013).In an experience sampling study of 148 people with longstanding psychotic disorders, 73 experienced hallucinations (Oorschot et al., 2012). Visual hallucinations often but not always co-occurred with auditory hallucinations; 10 of the patients reported visual hallucinations only, 25

reported auditory hallucinations only, whereas, 38 reported both types. Patients with both types of hallucinations reported higher levels of negative affect, and usually their experiences were associated with considerable distress.

Reality discrimination refers to a set of processes involved in the generation of attributions about the origins of memories and other experiences (Johnson, Hashtroudi & Lindsay, 1993). A number of researchers have argued that reality discrimination is implicated in the formation of hallucinatory experiences. Specifically, it has been proposed that hallucination-prone individuals present a specific bias towards the misattribution of internally generated cognitive events (e.g. thoughts, inner speech, mental imagery etc.) to sources that are external or alien to the self. (Bentall, 1990; Ditman & Kuperberg, 2005; McKague, McAnally, Skovron, Bendall & Jackson, 2012). These proposals have received support from a large number of studies which have employed a range of diverse experimental paradigms, including source memory paradigms (e.g. recognition tasks where participants are required to specify the source of specific remembered items, e.g. whether certain words had been previously generated by the participants or by another person; e.g., Bentall, Baker & Havers, 1991); self-monitoring paradigms (in which individuals have to discriminate online between their own distorted voice and the voice of another; e.g., Johns, Gregg, Allen, & McGuire, 2006; Johns et al., 2001; Johnson et al., 1993); and a signal detection paradigm (e.g., Bentall & Slade, 1985a). In this latter paradigm, individuals are asked to listen to brief bursts of white noise when, on certain trials, an auditory target signal (e.g. a human voice) is also presented. By analysing participants' pattern of responses (false alarms, hits, correct rejections and misses), it is possible to derive a measure of their bias towards assuming that a stimulus is present under conditions of uncertainty (response bias, 'β'), and also a measure of the participants' (perceptual sensitivity

'd'). Previous studies have found that both hallucinating psychotic patients and non-clinical hallucination-prone individuals present significantly lower response bias (i.e. a tendency to report the presence of perceptual events even when such events are not present) in the absence of perceptual sensitivity difficulty (Bentall & Slade, 1985a; Beck & Rector, 2003; Bentall et al., 1991; Choong, Hunter & Woodruff, 2007; Morrison, & Haddock, 1997; Rankin & O'Carroll, 1995; Varese, Barkus & Bentall, 2011, 2012; Vercammen, De Haan, & Aleman, 2008).

These findings have been further synthesized in a recent meta-analysis which considered "externalizing biases" not only signal detection studies, but also in source memory and self-monitoring studies (Brookwell, Bentall & Varese, 2013). Across these three paradigms, patients who are experiencing hallucinations as well or healthy participants with high hallucination predisposition (usually assessed by the Launay-Slade Hallucination Scale; Launay & Slade 1981; Bentall & Slade, 1985b) showed a marked tendency to be impaired in their ability to distinguish between self-generated and externally-generated events.

There has been very little research to investigate the signal detection errors of psychiatric patients in non-auditory modalities. However, patients often report visual as well as auditory hallucinations (see above), and questionnaire measures of the disposition towards hallucinations such as the Launay-Slade Scale (Launay & Slade, 1981) often contain both auditory and visual items, suggesting that there may be cross-modal externalization bias, or even that reality discrimination abilities are not modality-specific. In the research literature on reality discrimination in healthy individuals, cross-modal reality discrimination errors have been noted and it has been suggested that two mechanisms may be responsible: first, the experience of an event in one modality may stimulate the imagination of the event in another (e.g. a heard

event may stimulate the visual imagination of that event) leading to future mistakes when the event is generated in the modality it was imagined in. Second, source attribution processes may be influenced by general knowledge, beliefs and wishes, which may not be modality-specific (Henkel, Franklin, & Johnson, 2000).

Two studies with hallucination-prone individuals have employed visual paradigms that are sensitive to reality discrimination errors. Jakes and Hemsley (1986) asked students to watch a random dot display and report whether they saw simple or complex shapes; hallucination-proneness was found to be associated with reporting more complex shapes. Feelgood and Rantzen (1994) used a similar task, together with an auditory version, to assess university students with high and low Launay-Slade Hallucination Scale scores and found that students with high LSHS scores reported more meaningful stimuli in both modalities. Although these findings suggest that hallucination-proneness is associated with compromised reality discrimination for both auditory and visual stimuli, the tasks employed in these studies did not allow response bias and perceptual sensitivity to be measured separately, and the Launay-Slade Scale used to select students contained items referring to both modalities.

A recent study did attempt to address the modality-specificity of source monitoring deficits by examining schizophrenia patients with olfactory hallucinations. Patients with olfactory hallucination were less accurate in determining whether an odor had been imagined or smelled compared to patients with auditory hallucination or controls. In distinction, patients with auditory hallucination was less accurate in detecting the source of a word, compared to patients with olfactory hallucination and control group (Arguedas, Stevenson, & Langdon, 2012).

In summary, the modality-specificity of the source monitoring abnormalities associated with hallucinations remains unclear. Here we report a study which tested two hypotheses: first, that hallucination prone individuals will show lower response bias (β) scores than individuals who are not prone to hallucinations on the visual SDT task as been validated in the auditory SDT task (e.g., Bentall & Salde, 1985a, Barkus Stirling, Hopkins, Mckie, & Lewis, 2007; Barkus, et al., 2011; Varese, et al., 2011, 2012); second, to examine the efficacy of the current analogue visual task, there will be strong positive correlations between (i) perceptual sensitivity scores on the auditory and visual SDT tasks; and (ii) response bias scores on both tasks, to test whether impaired reality discrimination modality non-specific.

3.3 Method

3.3.1 Participants

A two-phase design was used. Phase 1 involved the recruitment of a large sample (N =418) of undergraduate and postgraduate students from the University of Liverpool, which was the same online screening conducted for experiment 1 of study 1 presented in Chapter 2. The minimum age was 18 and the maximum was 53, M_{age} = 21.22, SD = 4.13. Ninety-eight were male (23.4%) and 320 females (76.5 %). There was no difference in age between the males and females; $F(1,417)$ 3.39, p = .066. They were screened using four on-line measures and were invited to have their names included in a lottery for a prize of £100.

In Phase 2, 61 participants were recruited who had consented to be contacted about further lab-based research, and who scored in the upper third (scores equal or greater than 34, N = 31) or lower third (scores equal to or less than 27, N = 30) of the distribution of scores on the revised Launay-Slade Hallucination Scale (LSHS-R;

Bentall & Slade, 1985b); none had participated in the previous experiment. The minimum age was 18 and the maximum was 35, (M_{age} = 20.20 and SD = 3.39). Seven were male (11.5%) and 54 females (88.5%). There was no difference between the high and low hallucination-proneness participants for age, $t(1, 59)$ = 1.39, p = .89, but there was a difference regarding gender composition $\chi^2(1, N= 61)$ = 36.21, $p < .001$, reflecting the gender bias in those completing the initial questionnaires. Regarding the screening for the auditory and visual impairments in each of the two experiments, we asked each participants before performing either experiment if they have any hearing or sight problems: for the auditory task all the 61 students did not report hearing deficits. However, one female student reported a sight problem where she could not see small objects and this led us to drop her from the study. All the participants were native English-speakers, and they received a sum of £8 for their participation.

Bentall and Slade (1985) obtained significant differences between participants using just 10 high LSHS-scoring and 10 low LSHS-scoring participants per group, with an effect size of 1.53 for beta scores. However, in Brockwell et al's (2013) meta-analysis, the mean effect size for comparing low and high hallucination-prone students was 0.80 over 9 studies. Using this last value, G*power software estimates that a minimum sample size of 21 per group is required to detect a group difference at $p < .05$. There were no missing values.

3.3.2 Measures and procedure

3.3.2.1 The revised Launay-Slade Hallucination Scale (LSHS-R; Bentall & Slade, 1985b), the LSHS-R is a self-report scale of hallucination-proneness comprising 12 statements describing clinical as well as sub-clinical forms of auditory and visual hallucination (e.g. 'I often hear a voice speaking my thoughts aloud', 'On

occasions I have seen a person's face in front of me when no one was in fact there'). Participants are asked to rate the degree to which the content of each item applies to them, by ticking boxes labelled: '*certainly applies*', '*possibly applies*', '*unsure*', '*possibly does not apply*' and '*certainly does not apply*', with scores ranging from 0 to 60 (Bentall & Slade, 1985b). Higher LSHS-R scores represent increased proneness and vulnerability for experiencing hallucinations. In a study by Varese et al. (2011), the LSHS-R was found to have a good internal consistency ($\alpha = .82$). Within the larger sample of 418 $\alpha = .78$, and in the targeted 61 students $\alpha = .84$.

In addition to the LSHS-R scale, we included the Persecution and Deservedness Scale (PaDS; Melo, Corcoran, Shryane, & Bentall, 2009) the Dissociative Experience Scale (DES-II; Carlson & Putnam, 1993) and the Inventory of Suggestibility (IoS; Ordi & Miguel-Tobal, 1999) in the Phase 1 online survey. These scales were used for other purposes.

3.3.2.2 Auditory Signal Detection Task (SDT) (Barkus et al., 2007). Participants in both groups were asked to perform two identical runs of an auditory signal detection task developed by Barkus, Stirling, Hopkins, McKIE, and Lewis (2007) and used in subsequent studies (e.g., Varese et al., 2011, 2012). The task consisted of an 8-min block of sixty 8-s trials. Each trial consisted of a 5-s burst of white noise followed by 3-s of silence. During 60% of the trails, a 1-s voice is present in the middle second of the white noise. A third of the time the voice is clearly audible; in the remaining trials the voice is harder to detect. Stimuli were present through stereo headphones. After each burst of white noise, participants were requested to indicate whether they perceived a voice by pressing mouse buttons labelled 'yes' or 'no' using their preferred hand (Barkus et al., 2007). A two-minute practice run was provided. Within the framework of this task, participants' responses

can be classified as: hits (positive response when the signal is present), false alarms (positive responses when the signal is absent), misses (negative responses when the signal is present) and correct rejections (negative responses when the signal is absent). From the relationship between hits and false alarms, signal detection analysis measures of perceptual sensitivity d` and response bias 'β' can be obtained. A d` value of zero indicates a complete inability to distinguish between signals and background noise, whereas higher d` scores indicate better ability to detect true signals. Any β score lower than 1 suggests a bias towards the detection of signals when no signal is present, whereas scores equal to 1 indicate no response bias.

3.3.2.3 Visual SDT task. This task was developed specifically for this study, and was a visual analogue of the auditory task developed by Barkus et al. (2007). It was created using PsychoPy software and involved images presented behind a moving dot mask.

The dot mask was a 15 x15 deg square field in the centre of the screen with 26850 individual dots, drawn with the dotPatch function in PsychoPy, and was the same on every trial. Dot size was set to 3-pixel radius, speed 1 screen per second, all dots moved vertically downwards, with 100% coherence (all dots were signal dots). Dot life was very short at just 5 frames and, as they went off the edge of the stimulus, the dots were replaced randomly in the stimulus field. These parameters created no sense of coherent motion; because there were so many dots, the motion often created overlap and occlusions, partially revealing and concealing the image behind.

The task was presented on a laptop computer and consisted of one 8-minute block, comprising 60 trials; each is 8-s long. On each, the dot mask was presented for 5-s, followed by a clear screen. The objects, consisting of random non-coloured shapes (e.g., key, comb, bicycle, etc.) appeared in the centre of the fuzzy screen for

one second on 60% of the trials. On a third of these trials, the object was designed to be easy to detect, while the rest these trials were designed to be more difficult. Difficulty level was set by altering the opacity of the J Peg image behind the noise dot mask. This was set at either 0.74 (easy condition) or 0.42 (hard condition), where the scale goes from 0 (invisible) to 1.

The participants' job was to try and work out when the object was present and when it was not, by responding with presses on keys 1 and 2 of the computer keyboard. A two-minute practice run was provided, and then participants were asked to complete two runs. The same four measures – as in the auditory SDT – were obtained: hits (positive responses given when the voice was present), false alarms (positive responses given when the voice was absent), misses (negative responses when the voice was present) and correct rejections (negative responses when the voice was absent) allowing measures of perceptual sensitivity (d') and response bias (β) to be calculated.

The presentation of tasks (auditory and visual) was counterbalanced, so that half the participants in each group received both runs of the auditory task first while the rest received both runs of the visual task first. The two runs of each task allowed us to examine practice effects. This study was approved by IPHS Research Ethics Committee, at University of Liverpool; reference no. IPHS-1213-L13-074.

3.4 Results

3.4.1 Between-group differences in auditory and visual signal detection (SDT)

All 61 participants completed the experiment. There was no difference in age between the high and low hallucination proneness groups, $F(1, 59) = .02, p = .89$. The

two groups were also equivalent in terms of gender composition $\chi^2(1, N = 61) = .126$, p = .722.

A four-way mixed-model ANOVA was conducted on the β scores with two between subject factors (hallucination group and order of visual vs auditory trials first) and two within-subject factors (auditory vs visual tasks and first vs second run). There was a main effect for hallucination group $F(1, 56) = 58.18$, $p < .001$, partial η^2 = .51, which was explained by the hallucination-prone participants having lower β scores than the non-hallucination-prone participants across both modalities (see Table 3.1). The main effect for modality was also significant $F(1, 56) = 9.85$, $p < .05$, partial $\eta^2 = .15$, as all participants showed lower β scores for the auditory compared to the visual trials. The main effect for run 1 vs run 2 was also significant $F(1, 56) = 13.32$, $p = .001$, partial $\eta^2 = .19$, indicating a practice effect in which all participants became more conservative on the second trial in each modality.

Table 3.1

Descriptive statistics of β scores for the two tasks in the two Groups.

Groups		Visual task		Auditory task	
		1st run	*2nd run*	*1st run*	*2nd run*
Low	M	0.75	0.73	0.51	0.68
LSHS	SD	0.26	0.26	0.21	0.30
	N	30	30	30	30
High	M	0.25	0.36	0.20	0.28
LSHS	SD	0.22	0.20	0.29	0.36
	N	30	30	30	30

Note: β = response bias

All interactions were non-significant with the exception of a difficult-to-interpret three way interaction between hallucination group, visual vs auditory tasks and first vs second run $F(1, 56) = 8.57$, $p < .05$, partial $\eta^2 = .13$. When each groups' performance on the two runs of the visual SDT were compared, for the low hallucination-prone students there was no significant difference between the two runs of the visual task, $t(29) = 0.41$, $p = .69$, whereas, their performance on the auditory task became significantly more conservative, $t(29) = -3.25$, $p < .05$. On the other hand, the high hallucination proneness students became more conservative across the two runs of both tasks, $t(29) = -3.73$, $p = .001$, $t(30) = -2.04$, $p = .05$ for auditory and visual tasks respectively.

A similar analysis was carried out on the perceptual sensitivity data. On this measure, unexpectedly, there was a main effect for group $F(1, 56) = 14.0$, $p < .001$, partial $\eta^2 = .31$, accounted by the hallucination-prone students showing lower sensitivity than the non-prone students (see Table 3.2).

Table 3.2

Descriptive statistics of d'-prime scores for the two tasks in the two Groups.

Groups		Visual task		Auditory task	
		1st run	*2nd run*	*1st run*	*2nd run*
Low	M	1.96	2.1	1.65	1.96
LSHS	SD	0.57	0.49	0.36	0.36
	N	30	30	30	30
High	M	1.28	1.48	1.36	1.60
LSHS	SD	0.75	0.60	0.48	0.28
	N	30	30	30	30

Note: d' = perceptual sensitivity

There was also a main effect for run $F(1, 56) = 28.60$, $p < .001$, partial $\eta^2 = .34$, indicating greater sensitivity on the second compared to the first run of each task, and that participants' capacity to detect signals in the noise generally increased over the course of both tasks. The main effect for auditory vs visual tasks was not significant. The only significant interaction was between order of trials and hallucination group $F(1, 56) = 4.28$, $p < .05$, partial $\eta^2 = .08$. However, the confidence intervals for non-prone participants (auditory first: 1.69 – 2.07, visual first: 1.74 - 2.13) and the high hallucination-prone students (auditory first: 1.28 – 1.66, visual first: 1.19 – 1.57) indicated that the within group differences due to order were not significant.

3.4.2 Correlational analyses of response bias and perceptual sensitivity scores on the auditory and visual SDTs

With respect to the second hypothesis; Pearson's correlation analyses were carried out on the data, as presented in Table 3.3. All the four variables were positively and strongly associated with each other when all participants were considered. When within-group correlations were calculated, the correlations were generally much lower, and very few were significant.

3.4.3 Modality-specific effects?

It is possible that only people with visual hallucinatory impairments will be impaired on the visual SDT task and only those with auditory hallucinations will be impaired on the auditory task. However, the LSHS is a general measure of disposition towards hallucinations, with only one visually-specific item (item 9, "On occasions I have seen a person's face in front of me when no one was in fact there), several auditory-verbal items (e.g., item 8, "In the past I have had the experience of hearing a person's voice and then found that no one was there" and item 12, "I have been

troubled by hearing voices in my head") with the remaining items being non-specific

for modality (e.g. item 4, "Sometimes a passing thought will seem so real that it

frightens me").

To try and address the relationships between the two SDT tasks and specific

hallucinatory dispositions we therefore factor-analysed the LSHS-R, using the data

from the 418 students in phase 1, whose scores ranged from 14 to 51 (mean score =

30.59, SD = 7.98). Principal Component Analysis (PCA) with an oblique rotation

(Oblimin with Kaiser Normalization) was carried out, repeating a previous analysis by

Waters, Badcock, and Maybery (2003). All factors with eigenvalues greater than one

were retained and compared to decide the number of factors. On this basis, four

factors accounting for 62.05% of the variance were found. The rotated factor loadings

above .30 for the four-factor solution are shown in Table 3.4.

Table 3.3

Correlation matrix of signal detection variables.

	All groups			High group			Low group		
	V- β	A- d'	V- d'	V- β	A- d'	V- d'	V- β	A- d'	V- d'
Audi- β	.632 (P< .001)	.558 (P< .001)	.478 (P< .001)	.314 (P=091)	.407 (P< .05)	.277 (P= .139)	.294 (P=.114)	.515 (P< .05)	.294 (P= .114)
Vis- β		.414 (P< .001)	.648 (P< .001)		.091 (P= .632)	.309 (P= .097)		.135 (P= .478)	.710 (P< 001)
Audi- d'			.450 (P< .001)			.368 (P< .05)			.148 (P= .436)

Table 3.4

Four-factor Oblimin solution showing item loadings above 0.30 on the LSHS-R.

LSHS-R Items	Factor I	Factor II	Factor III	Factor IV
4. Sometimes a passing thought will seem so real that it frightens me	0.87			
6. The people in my daydreams seem so true to life that sometimes I think that they are	0.75			
3. Sometimes my thoughts seem as real as actual events in my life	0.73			
1. No matter how hard I try to concentrate, unrelated thoughts always creep into my mind	0.56			
11. In the past, I have heard the voice of God speaking to me		0.85		
10. I have heard the voice of the Devil		0.84		
2. In my daydreams I can hear the sound of a tune almost as clearly as if I were actually listening to it			0.90	
5. The sounds I hear in my daydreams are generally clear and distinct			0.84	
7. I often hear a voice speaking my thoughts aloud			0.54	
8. In the past, I have had the experience of hearing a person's voice and then found that no one was there				-0.83
9. On occasions, I have seen a person's face in front of me when no-one was in fact there				-0.81
12. I have been troubled by hearing voices in my head		0.36		-0.43

The first factor, which accounted for 30.27% of the variance (items 4, 6, 3, and 1) contained items about thoughts and daydreams. The second factor accounted for 13.14% of the variance and included two items (11 and 10) that refer to religious themes. The third and fourth factors accounted for 9.69% and 8.96% of the variance respectively and refer to the clarity of voices heard (items 2, 5 and 7) and auditory and visual hallucinatory experiences (items 8, 9 and 12). Of note, item 12 loaded on Factor II but more strongly on Factor IV. This result was slightly different from that obtained by Waters et al. (2003), who found three factors corresponding to our Factors number I, II and IV; items 2 and 5 from the present Factor III were included in their first factor and item 7 was included in their third factor.

Table 3.5

Correlational analyses between auditory/visual LSHS-R and auditory/visual SDT tasks.

LSHS-R	Aud-H items	Vis-H item
SDTs parameters		
Aud- β	-.41 (p ≤ .001)	-.14
Aud- d'	-.30 (p < .05)	-.11
Vis- β	-.48 (p < .001)	-.31 (p < .05)
Vis- d'	-.38 (p < .01)	-.20

Note: Aud-H= auditory hallucination, Vis-H= visual hallucination

Given this factor structure, it was decided to examine the relationships between the two auditory items and the one visual item in Factor IV. The auditory

STD β scores was correlated with the auditory items (8, 12) but not with the visual item (9); the same was for the auditory STD d' scores. However, the visual STD β scores were correlated with both auditory and visual items of the LSHS-R. Surprisingly, the visual STD d' scores were correlated with the auditory items of the LSHS-R but not with the visual item (see Table 3.5).

3.5 Discussion

The present study investigated the difference between hallucination-prone students and students who are not prone to hallucination on both auditory and visual SDT tasks. The groups scored differently on β on both tasks. This result for the auditory task replicates the results of previous studies with both clinical (Varese et al., 2012; Vercammen, De Haan, & Aleman, 2008) and non-clinical samples (Barkus et al., 2007; Bentall & Slade, 1985a; Rankin & O'Carroll, 1995; Varese et al., 2011). Hence, the present findings are consistent with previous experimental data indicating that externalization bias plays a role in hallucinations (Brookwell et al., 2013).

However, this study also found a difference between the groups on d' scores, indicating that the highly hallucination-prone group were impaired relative to the control group in their accuracy to detect the signals on both auditory and visual tasks. Although most previous studies have not found differences in perceptual sensitivity between hallucination-prone and non-prone individuals, McKague et al., (2012) reported a marginally significant effect of high hallucination-prone group on the item memory sensitivity (*d`*) score, reflecting a propensity to be slightly less accurate than low hallucination-prone group. Nonetheless, our finding for d' is inconsistent with other studies which have used auditory SDT tasks and found no difference between high and low hallucination-prone subjects on perceptual sensitivity (Barkus et al.,

2007; Bentall & Slade, 1985a; Rankin & O'Carroll, 1995; Varese et al., 2011, 2012).

One possible explanation for this inconsistency might be that, in this first attempt to examine reality discrimination ability in both visual and auditory modalities using SDT, the four runs undertaken by the participants (as opposed to two runs in most previous studies) afforded greater opportunity to detect sensitivity differences.

The primary aim of the present study was to determine whether the reality discrimination abnormality of hallucination-prone individuals is restricted to the auditory modality. In previous experimental studies, no STD comparisons have been made between different modalities and, hence, we believe that this is the first study to attempt to answer this question. As both visual and auditory reality discrimination were impaired in the hallucination-prone group, the findings from simple group comparisons seem to suggest that this impairment is not modality specific, raising the possibility of a common mechanism. This might be because, as Henckel et al. (2001) suggest, the experience of externalized events in one modality may provoke externalized experiences in another (for example, as might be the case when a hallucinating patient hears a voice and sees a disembodied image of the person speaking) or because common factors influence source monitoring judgments in the two modalities.

However, in contrast to our group comparisons, the findings from our correlational analyses were ambiguous but suggest a more complex picture. Although robust correlations were observed between the response bias (β) and perceptual sensitivity (d') scores in both tasks, it should be remembered that we sampled individuals who were either high or low in hallucination proneness, rather than across the spectrum. When within-group correlations between visual and auditory task

112

performance were calculated these were generally of lower magnitude than the correlations observed when all of the participants were considered together.

Moreover, when we attempted to examine the relationships between signal detection and scores on particular items of the LSHS-R pertaining to auditory and visual experiences, we found that the auditory items correlated with scores on both SDT tasks but the single visual item correlated with β scores on the visual task only. A possible interpretation is that auditory hallucinatory experiences reflect a more severe form of psychopathology than visual hallucinatory experiences, but this interpretation must be considered highly tentative because of the very limited existing information about modality-specific hallucinations experiences available. A priority for further research should therefore be to repeat this study with suitable measures.

Aside from this problem, this study had some further methodological limitations that should be mentioned. Firstly, the participants used in this investigation were students selected according to their scores on questionnaires rather than psychiatric patients. However, previous studies have found similar SDT effects in hallucinating patients and hallucination-prone non-patients (e.g., Brookwell et al., 2013). A further limitation is the fact that the participants were not administered a general measure of cognitive functioning (e.g. IQ), which might, in principle affect SDT performance. However, because our participants were university students, it is unlikely that group differences in general cognitive function could have affected the results. Finally, The sample was relatively modest in size (although adequately powered), and based on a convenience sample that allows the possibility of a bias in referral to the study and limiting the generalizability and statistical power of the findings. The skew towards female participants may also limit the generalizability of the findings to the populations.

The main implication of the present findings is that both researchers and clinicians should pay more attention to non-auditory hallucinatory experiences. Exploring these using experimental measures which are analogous to those used to study auditory hallucinations may well shed more light on the mechanisms responsible for positive symptoms. If hallucination-proneness is associated with a modality non-specific impairment, this would explain why many (but not all) patients who experience auditory hallucinations also experience visual hallucinations and, moreover, that the two types of hallucinatory experiences often occur at the same time (Oorschot et al., 2012). Such a common mechanism might be restricted to the domain of reality discrimination but might also be more general, for example a failure in Bayesian updating as proposed by Fletcher and Frith (2009). As already noted, in future studies it might be fruitful to compare patients who experience hallucinations exclusively in each modality (although this may be difficult for exclusively visual hallucinations, which may be very rare) as well as patients who experience hallucinations in both modalities, and to include more general measures of cognitive functioning.

In the clinical context, it seems likely that visual hallucinations are under-recognised and that clinicians need to direct more effort towards assessing them systematically and considering their consequences for wellbeing. If auditory and visual hallucinations share a common mechanism regarding response bias, further research will be required to better characterise the common underlying cognitive abnormality. It is possible that improved cross-modal source monitoring could be promoted by metacognitive training (MCT), which aims to help patients to bring their metacognitive limitations to their attention and to critically reflect on their current problem solving and to enhance their metacognitive efficiency (Aghotor, Pfueller,

114

Moritz, Weisbrod, & Roesch-Ely, 2010). There is evidence that, in psychotic patients,

hasty decision-making can be reduced by a brief reasoning training based on MCT

(Ross, Freeman, Dunn, & Garety, 2011).

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Chapter 4

Suggestibility and reality discrimination biases in Saudi hallucinating patients

4.1 Abstract

Introduction: Auditory hallucinations are associated with reality discrimination biases and suggestibility. However, the majority of research on these phenomena has been from the English-speaking world. We examine the extent to which suggestions influence performance on a signal detection task in hallucinating patients and non-hallucinating patients in the Middle East (i.e., Saudi Arabia).

Methods: 72 hallucinating and non-hallucinating psychotic patients were interviewed twice and completed a set of seven assessments, including The Positive and Negative Syndrome Scales, The Inventory of Suggestibility and the Beck Depression Inventory-II. Prior to performing an auditory signal detection task, expectations were experimentally manipulated by instructions pertaining to the number of expected targets presented in the task (no suggestion vs high suggestion vs no voices suggestion).

Results: Consistent with previous research, hallucinating patients showed a higher bias towards detecting signals. We also found that hallucinating patients were more reactive to the high suggestion condition than the non-hallucinating controls.

Conclusion: Source monitoring bias seems to be cross-culturally valid. Suggestions also seems to affect source monitoring judgments, and this effect may be greater in those who currently experiencing hallucinations.

4.2 Introduction

4.2.1 Hallucinations and Cultural context

Hallucinations have been defined as perception-like experiences that occur in the absence of an appropriate stimulus, have the full force or impact of the corresponding actual (real) perceptions and are not amenable to direct and voluntary control by the experiencer (Slade & Bentall, 1988). They can happen in any sensory modality (APA, 2013). They are frequently reported by patients with diagnoses in the schizophrenia spectrum (Bentall, 1990), and also by patients with other diagnoses such as bipolar disorder (Baethge et al., 2005). In clinical samples, these experiences are most often in the auditory modality and often cause considerable distress (Blom & Sommer, 2010; Ratcliff, Farhall, & Shawyer, 2011). When hallucinations take the form of commands, whether or not they are obeyed depends, not only on the nature of its commands, but on beliefs about the voices, with obedience more likely if the voice is believed to be benevolent, authoritative, or uncontrollable (Beck-Sander, Birchwood, & Chadwick, 1997). The extent to which individuals feel subordinate to their voices appears to be closely related to the extent to which they feel subordinate in relationships in real life (Birchwood, Meaden, Trower, Gilbert, & Plaistow, 2000).

Severe psychotic complaints have been documented across cultures, with similar types of symptoms (Jablensky et al., 1992), although there is growing awareness that culture might shape the meaning, content, and perhaps the severity of these symptoms (Larøi et al., 2014; Murphy, 1976). Al-Issa (1995) proposed that Euro-American culture inhibits hallucinatory experiences because shared cultural values emphasize the struggle to clarify and distinguish whether a particular experience is real or imaginary, with the consequence that the failure to make this

distinction is considered highly pathological. Differences in cultural background may also affect the expression of hallucination in patients. For example, Azhar, Varma, and Hakim (1993) examined phenomenological differences in hallucinations between schizophrenia patients recruited from west (Penang, where most people are Chinese) and east (Kota Bharu, where most people are Malay) regions of Malaysia, a country in which culture is relatively varied. Results indicated that cultural beliefs can be more important than ethnicity and religion in influencing the symptoms of the illness. For example, Kelantan Malay patients had sometimes heard voices attributed to God (37%) whereas none of the Kelantan Chinese patients did.

Few studies, however, have been conducted with patients from Saudi Arabia, where visual and auditory hallucinations are commonly reported and content is related to cultural background (e.g., Zarrouk, 1975). Kent and Wahass (1996) studied the characteristics and content of auditory hallucinations reported by schizophrenia patients from Britain and from Saudi Arabia. Most Saudi patients reported that their voices involved religious and superstitious themes, while the British patients were most likely to report the giving of instructions. A related study revealed that coping mechanisms were also affected by cultural background. Saudi patients were most likely to use religious behaviours to cope with their voices (43% engaged in prayer or read the Holy Book, the "Quran", only 3% of UK patients reported comparable activities). British patients were more likely to use distraction (42% vs. 5% for Saudis) and to engage in physical activities (61% vs. 14%), suggesting that culture-compatible therapeutic strategies need to be employed in order to help patients in non-European cultures (Wahaas & Kent, 1997).

4.2.2 Source monitoring

Research over the past three decades has converged on the hypothesis that hallucinations occur when individuals fail to discriminate between internally-generated mental events and external stimuli (Bentall, 1990). Evidence for this source monitoring account has been obtained using a variety of experimental paradigms, including memory source monitoring, self-monitoring (in which individuals are asked to discriminate between their own speech and substituted speech from others) and also signal detection paradigms (for a review, see Ditman & Kuperberg, 2005). The result showed that patients who are experiencing hallucinations, or healthy participants with high hallucination predisposition, are impaired in their ability to distinguish between real and imaginary events, and specifically tend to misattribute internally generated cognitions to an external source (e.g. Beck & Rector, 2003; Bentall, Baker, & Havers, 1991; Bentall & Slade, 1985; Choong, Hunter & Woodruff, 2007; Morrison, & Haddock, 1997; Rankin & O'Carroll, 1995; Varese, Barkus & Bentall, 2011, 2012; Vercammen, De Haan, & Aleman, 2008). These observations have been supported by a recent meta-analysis (Brookwell, Bentall, & Varese, 2013).

Signal detection theory (SDT) has often been used to study the ability of individuals to detect stimuli against background noises (Bentall & Slade, 1985; Bentall & Varese, 2013). Most studies that have used this technique have found that hallucination and hallucination-proneness are associated with more response bias towards detecting signals but not with perceptual sensitivity impairment (e.g. Alganami, Varese, Wagstaff, & Bentall, 2017; Barkus, Stirling, Hopkins, McKie, & Lewis, 2007; Bentall & Slade, 1985; Rankin & O'Carrol, 1995; Varese et al., 2011, 2012). This bias results in a tendency to present false alarms under the conditions of uncertainty (Bentall & Varese, 2013).

124

4.2.3. Suggestibility and hallucinatory experiences

Several studies have shown that people who score high on questionnaire measures of hallucination-proneness also tend to score high on questionnaire measures of suggestibility (Alganami et al., 2017; Barkus et al., 2010; Merckelbach & van de Ven, 2001; van de Ven & Merckelbach, 2003; Young, Bentall, Slade & Dewey, 1987). A recent study by Terhune, Cardena and Lindgren (2011), also with student participants, reported that individuals who are highly dissociative and highly suggestible (to imaginative suggestions generally) were more responsive to hallucination suggestions. Some studies have also reported that, in some circumstances, actual suggestions can induce hallucinatory experiences. For example, some healthy people can be led to report hearing stimuli by simple suggestions such as "Close your eyes and listen to the record White Christmas" (Barber and Calverley, 1964) and this effect is greater in patients with a history of hallucinations (Mintz & Alpert, 1972; Young et al., 1987) or who score highly on questionnaire measures of hallucination-proneness (Young et al., 1987).

These studies have used direct or primary suggestions. However, a study by Haddock, Slade and Bentall (1995) also examined responses to suggestions in hallucinating patients, non-hallucinating patients and healthy controls. The study examined the verbal transformation effect (VTE), a phenomenon in which a word that is repeatedly presented to the individual (in this study, the nonsense word "tress") is experienced as changing into other words (Warren, 1968); it has been suggested that a high number of transformations may be associated with hallucination proneness (Slade, 1976). Haddock et al. (1995) assessed the VTE under two conditions: one in which the hallucinating psychotic patients, non-hallucinating patients and healthy controls were accurately instructed that the word never changed, and the other in

which they were told that it would change. Hallucinating patients, compared to both the psychiatric and the healthy control groups, reported more transformations when there was the suggestion that the word would change but fewer transformations when it was suggested that they would not. Although interpreted as evidence that previously reported VTE abnormalities were the consequence of experimental demands, this finding indicates that hallucinating patients' judgments about their own perceptions are highly sensitive to indirect suggestions.

In our pervious study (Alganami et al., 2017) we investigated the effect of these kinds of suggestions on university students' performance on a signal detection task (e.g., Bentall, & Slade, 1985; Varese et al., 2011, 2012). Our results showed that suggestibility as measured by Inventory of Suggestibility (IoS; Ordi & Miguel-Tobal, 1999) was associated with hallucinations proneness as measured by LSHS-R in a correlational analysis. We also examined the influence of suggestion (with two conditions of high and low voices suggestions in Experiment 1; and three conditions of no suggestion vs high voices suggestion vs no voices suggestion in Experiment 2). We found a robust effect of suggestions on their response bias (β) scores on the signal detection task (SDT) which was observed in both experiments. Both high hallucination prone individuals and low hallucination prone controls produced lower response bias scores (implying a greater willingness to detect signals) following the high suggestion conditions in Experiment 1 and 2; in the second experiment (but not the first) we also found that highly hallucination prone students were more reactive to the high suggestion condition than the controls. Hence, source monitoring judgments appeared to be sensitive to suggestions, especially in those prone to hallucinate.

Our primary aim in the present study was to investigate the effects of suggestion on source monitoring (SDT) in hallucinating psychotic patients, using the same

methods employed in our previous study (Chapter 2). Specifically, we hypothesised that 1) indirect suggestions would have an impact on response bias scores in both hallucinating and non-hallucinating psychotic patients, and 2) this impact would be more pronounced in hallucinating patients. A second aim was to examine the relationship between self-report measure of trait suggestibility (IoS), and hallucinations in the same sample. We hypothesised that 3) there would be a close association between suggestibility and hallucination reports and that this association would remain robust and significant even when controlling for symptom dimensions that frequently covary with hallucinations, namely paranoid ideation and/or depressive symptom. Given that this study was conducted with patients in Saudi Arabia, a final aim was to establish the cross-cultural validity of previous findings linking source monitoring, suggestibility and hallucinations.

4.3 *Method*

4.3.1 Patients

Seventy two inpatients with the diagnosis of schizophrenia spectrum took part. In Brockwell et al's (2013) meta-analysis, the mean effect size for comparing hallucinating and non-hallucinating patients was 0.59 over 15 studies. Using this value, G*power software estimates that a between group comparison will have a power of 0.79 to detect a difference at p < .05.

Initially 101 patients who were approached, but 29 were not included in the study for one of the following reasons: unwillingness to take part, severely impaired communication skills or severe thought disorder, or discharge from the hospital before the completion of the experiment. They were recruited from the Mental Health Hospital in Jeddah, Saudi Arabia. All were in receipt of antipsychotic medication.

Participants were aged between 18 - 60 years, M_{age} = 36.09 and SD = 10.18; 47 (65%) were male and 25 female (35%). Most had a low level of educational attainment (i.e. 39% had completed only elementary school and a further 38 % had completed secondary school). Diagnoses, assigned by the responsible clinicians using DSM-IV criteria, were obtained from the patients' case notes. Sixty were diagnosed with schizophrenia (83%), 9 were diagnosed with schizoaffective disorder (13%), and 3 were diagnosed with delusional disorder (4%). Thirty eight (53%) of the patients were hearing voices whereas thirty four (47%) were not during the week preceding the first of assessment. There was no difference between hallucinating and non-hallucinating patients for age, $t(70)$ = .28, p = .78, or gender composition $\chi^2(1, N= 72)$ =2.69, p = .10. Their scores on the subscales of PANSS revealed a difference on only the positive symptomology subscale, $F(1,71)$ = 8.25, $P < 01$ (Table 4.1), whereas there was no differences on the other dimensions, or when excluding the hallucinatory item from the positive subscale (negative symptom, general psychopathology, positive symptom without hallucination item, $F(1,71)$ = 3.95, 2.71, 2.60 respectively).

All potential patients were approached and informed about the study by someone involved in their care (e.g., their psychiatrist, psychologist or nurse). Patients judged to lack mental capacity to consent by their care team or by the researcher, and patients or for who Arabic was not their first language were excluded. Ethics approval for the study was obtained from the University of Liverpool Research Ethics Sub-Committee, reference no: RETH000736 and from the hospital Committee of Scientific Research Ethics, reference no: H-02-J-002 (which is registered with the National Committee of Bio and Medical Ethics), Saudi Arabia. (Because the patients were from outside the UK, approval from an NHS Ethics Committee was inappropriate. The Saudi National Committee of Bio and Medical Ethics interviewed

the researcher to ensure the safety and right of the psychotic patients included in this research, and to determine that the research would not disrupt the provision of clinical services.)

Table 4.1

Mean and standard deviation of PANSS subscales for the two patients' groups.

PANSS	Hallucinating (n = 38)	Non- hallucinating (n = 34)
Positive symptom	22.61 (3.78)**	19.85 (4.00)
Negative symptom	21.68 (5.46)	19.12 (6.03)
General psychopathology	46.34 (7.03)	43.56 (7.30)
Positive symptom without hallucination	17.34 (3.54)	18.76 (3.94)

*Note: ** = p < .01*

4.3.2 Measures

2.2.1. The Positive and Negative Syndrome Scale (PANSS: Kay, Opler, &Fiszbein, 1987) is a 30 item semi-structured interview of psychotic symptomatology, assessing three symptom dimensions: positive symptoms, negative symptoms, and general psychopathology. Each item is scored on a 7-point Likert scale ranging from 'absent' (1) to 'extreme' (7). Seven items assess positive symptoms, 7 items measure negative symptoms and 16 items test general psychopathology. PANSS has demonstrated good evidence of reliability, criterion-related validity, and construct validity (Kay, Opler, & Lindenmayer, 1988), and Cronbach's Alpha = .81 in our sample.

Training in the PANSS was provided to the first author by researchers at Liverpool University. The first author, who is bilingual Arabic-English, then administered the Structured Clinical Interview for PANSS in Arabic.

2.2.2. The Inventory of Suggestibility (IoS; Ordi & Miguel-Tobal, 1999) is a 22-item assessment of trait suggestibility, comprising four subscales including dreaming (e.g. 'I dream about the things that occur to me or that I would like to experience'), absorption (e.g. 'when I concentrate on something, I become absorbed'), emotional involvement (e.g. 'I cry easily when I watch sentimental movies'), influencing of other (e.g. 'other people´s opinions are very important to me'). Barkus, Stirling, and Cavill (2010) used an English translation of the scale with a sample of 230 students and university staff and reported a total score α coefficient of .82. IoS questionnaire was included as a trait measure of suggestibility, and α = .92 in our sample.

2.2.3. The Persecution subscale of the Persecution and Deservedness Scale (PaDSp; Melo, Corcoran, Shryane, & Bentall, 2009) is a 10-item self-report measure assessing persecutory beliefs (e.g., ''I'm often suspicious of other people's intentions towards me?''), rated on a 5-point Likert scale (0 ''certainly false'' to 4 ''certainly true''). The α coefficient for the scale of .87 was reported by Varese et al. (2011), and α = .81 in our sample.

2.2.4. The Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996) measures depressive symptoms and attitudes, with 21 items rated from 0 'none or minimal' to 3 'severe'. The BDI-II has high internal consistency, with α =.93 (Beck et al., 1996) and α = .88 in our sample.

In addition to the PANSS, the IoS, the PaDS and the BDI-II we administrated the Dissociative Experience (DES-II; Carlson & Putnam, 1993); the Childhood Trauma Questionnaire (CTQ; Bernstein and Fink, 1998); and the Varieties of Inner Speech Questionnaire (VISQ; McCarthy-Jones & Fernyhough, 2011), but these data are not reported here.

2.2.5. *Signal detection task (SDT; Barkus et al., 2007)*, the task consists of one 8-min block of sixty 8-s trials. Each consists of one 5-s burst of white noise followed by 3-s of silence. During 60% of trials, a 1-s voice is present during the white noise. A third of the time the voice is clearly audible; in the remaining trials the voices are harder to detect. Stimuli were present through stereo headphones. After each trial, participants were requested to indicate whether they perceived a voice by pressing mouse buttons labelled 'yes' or 'no' using their preferred hand (Barkus et al., 2007). A two-minute practice run was provided, and the participants were asked to perform three runs of the task with three different conditions of suggestions.

We calculated estimates of perceptual sensitivity, d`, and response bias, β; a d` value of zero indicates a complete failure to distinguish between signals and background noise, whereas higher d` scores indicate better ability to detect true signals. Lower the β scores indicate a greater bias towards assuming that signals are present as reflected in higher rates of correct detections and false alarms (for more details refer to 'Barkus et al., 2007').

4.3.3 Procedure and summary of design

Back translation was used to ensure adequate translation of the research materials. The three questionnaires were translated into Arabic by the researcher whose first language is Arabic. They were then back translated into English by two

Saudi PhD psychology students, one studying in England, and the other in Canada. The back translated version was reviewed by Prof. Bentall, the researcher's supervisor to identify potential difficulties; a few minor anomalies were noted and addressed by the researcher. The final Arabic version of the three scales were then checked by Dr. Arwa Arab (head of the Department of Psychology at King Abdu-Aziz University, who gained her PhD degree in child clinical psychology from the University of Southampton, England). Finally, the translated scales were piloted on 10 Saudi students to verify ease of comprehension.

Patients with the diagnosis of schizophrenia spectrum disorder were divided into two subgroups according to whether or not they experienced auditory hallucinations in the week preceding assessment. The hallucinating patients group (n = 38) comprised patients who have reported auditory hallucinations on at least one occasion over the assessment period. The non-hallucinating patients group (n = 34) reported no hallucinations throughout the period. The investigation was planned across two sessions although some patients were able to complete it in one.

In Session 1, the researcher interviewed the patient using PANSS (Kay et al., 1987) to assess participants' present mental state. Demographic information was collected and then participants completed the IoS, the DES-II and the VISQ.

During Session 2 patients completed the BDI-II, the PaDS, and CTQ; there were no missing data for these measures. Finally they performed on the SDT, which was used to assess their source monitoring abilities with three different suggestion conditions based on the previous study by Alganami et al. (in press), (Experiment 2 in Chapter 2) as follows:

No suggestion (baseline); *participants were told that on this version of the task the voice would be present on some of occasions, but it will sometimes be very quiet*.

<u>High suggestion</u>; *on this version, participants were told that the voice would be present on 70% of occasions, but it will sometimes be very hard to hear.*

<u>No voices suggestion</u>; *on this version of the task, participants were told that there would be no voice present, but some people occasionally think that they hear voices in these circumstances, which is perfectly normal.*

Hallucinating and non-hallucinating patients were assigned to all three conditions (no suggestion, 'high number of voices' and 'no voices'), with the order of presentation counterbalanced for only the 'high number of voices' and the 'no voices' conditions (the no suggestion condition was always first). The session finished with debriefing the patient.

4.4 Results

4.4.1. Comparing groups on PANSSp3, IoS; PaDSp, and BDI-II in correlational analysis

Prior to the main analyses the relationship between PANSSp3 (hallucinatory symptomology) and IoS was assessed while controlling for comorbid symptoms (i.e., Paranoia 'PaDSp' and depression 'BDI-II'). The mean score of hallucinating patients on IoS scale was 40.66 (SD = 6.23), whereas the non-hallucinating patients' mean score was 25.44 (SD = 9.84), which was a significant different "$t(70) = 7.92, p < .001$".

Hallucination scores were significantly and strongly associated with suggestibility when both PaDSp and BDI-II scores were controlled for ($r = .72, p < .001$) and when they were not ($r = .70, p < .001$). When PANSSp6 (persecution) and PANSSg6 (depression) were used also to control for symptoms comorbidity, the correlation between hallucination and suggestibility remained strong and significant (r

= .70). However, there was not any association between suggestibility and paranoia either when controlling for hallucination and depression (r = -.17, p = .173) or when not (r = -.09, p = .432).

4.4.2 *Group differences in signal detection and suggestion*

A mixed design ANOVA was conducted on β scores (response bias) (see Table 4.2) using patient groups (hallucinating and non-hallucinating) and suggestion order (no-voice suggestion 1st vs. high suggestion 1st) as between-subject factors and conductions (no suggestion, high suggestion, no voices suggestion) as a within-subject variable. Persecution scores (PaDSp) were used as covariates.

PaDSp was not a significant covariate. There was a significant main effect of condition on β scores, $F(2, 134) = 4.73$, $p < .05$, partial $\eta^2 = .07$, indicating that the patients' performances on the task changed due to the suggestions they have been given. A main effect of hallucination was found, $F(1, 67) = 187.79$, $p < .001$, partial $\eta^2 = .74$, indicating that hallucinating patients had significantly lower response bias scores than non-hallucinating patients. An interaction between suggestion conditions and hallucination was also found $F(2, 134) = 24.14$, $p < .001$, partial $\eta^2 = .27$, revealing that the suggestions had the predicted influence on the hallucinating patients' performances more than non-hallucinating group.

However, the effect of the suggestion order was not significant $F(1, 67) = 0.04$, $p = .851$, partial $\eta^2 = .00$, and the interaction between suggestions order and hallucination was also non-significant $F(1, 67) = 0.35$, $p = .557$, partial $\eta^2 = .01$, (Figure 4.1). When the same analysis was carried out with PANSSp6 as the covariate the results were essentially the same.

Table 4.2

Mean and confidence interval of β and d' scores for the two patients' groups.

Patients groups		No suggestion		High suggestion		No-voices suggestion	
		β	d'	β	d'	β	d'
Hallucinating	M	0.13	1.20	-0.01	1.03	0.27	1.42
	95% CI	.086-.175	1.070-1.337	-.060-.040	.866-1.188	.226-.313	1.313-1.531
Non-hallucinating	M	0.55	1.73	0.49	1.81	0.60	1.68
	95% CI	.502-.596	1.578-1.861	.435-.540	1.626-1.967	.544-.636	1.550-1.780

Note: β = response bias, d'= perceptual sensitivity

Inspection of confidence intervals revealed that the hallucination group also differed from the non-hallucinating group on all conditions. For the non-hallucinating group, β scores differed between the no voice suggestion condition and no suggestion condition, and between the high voice suggestion condition and the no voice suggestion condition.

Figure 4.1

β scores with the association to hallucinations and suggestion conditions.
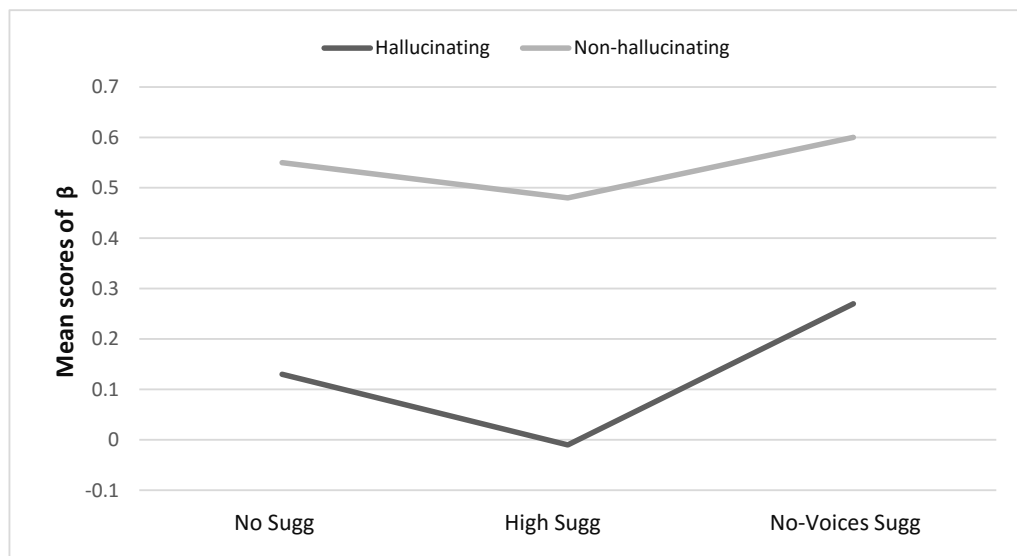
When the same analysis using PaDS as a covariate was carried out on the d' scores (perceptual sensitivity) (see Table 4.2) the main effect of suggestion was not significant, $F(2, 134) = 0.48$, $p = .619$, partial $\eta^2 = .01$. However, an unexpected main effect of hallucination was found, $F(1, 67) = 41,13$, $p < .001$, partial $\eta^2 = .38$, indicating that hallucinating patients presented significantly lower perceptual sensitivity scores than non-hallucinating patients. The interaction between suggestion conditions and hallucination was significant, $F(2, 134) = 12.85$, $p < .001$, partial $\eta^2 = .16$, revealing that the suggestions had the different effects on the two groups across

the three conditions (see Figure 2). The effect of the suggestion order was not significant $F(1, 67) = 2.19$, $P= .143$, partial $\eta^2= .03$, and the interaction between suggestions order and hallucination was also non-significant $F(1, 67) = 0,35$, $p = .558$, partial $\eta^2= .01$. Again, similar results were obtained using PANSSp6 as the covariate.

Inspection of confidence intervals revealed that, for the hallucinating group scores in the high suggestion condition was lower than no-voice suggestion, but it did not differ from the no suggestion condition. For the non-hallucinating group, d' scores did not differ between all the three conditions.

Figure 4.2

d' scores with the association to hallucinations and suggestion conditions.
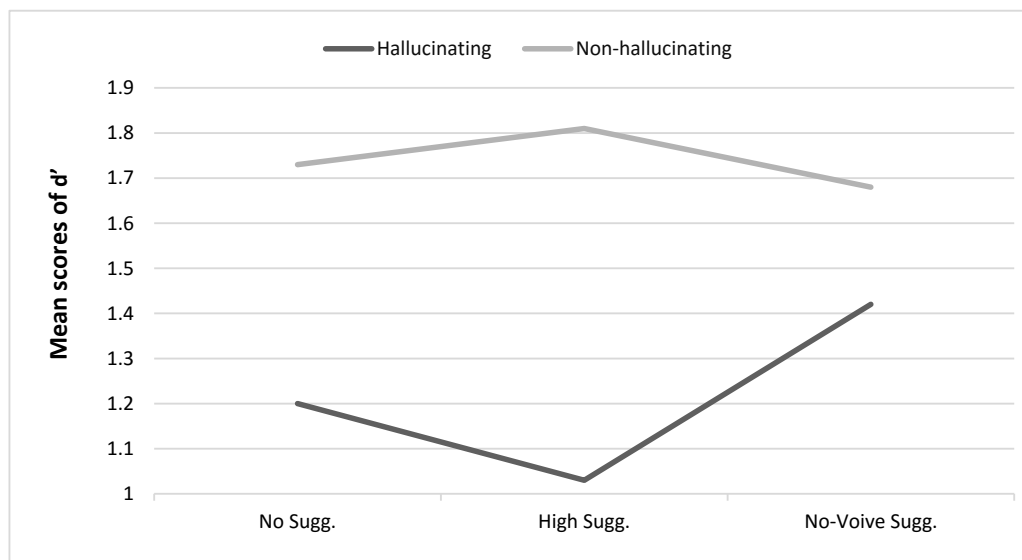
4.5 Discussion

Our data analyses revealed that trait suggestibility was strongly correlated with hallucination severity as measured by PANSS whether or not controlling for paranoia and depression. This result is consistent with analogue studies with healthy individuals by Alganami et al. (2017, Chapter 2) and Barkus et al. (2010). This finding seemed to be fairly specific to hallucinations, as no relationship was found between suggestibility and paranoia.

The groups' performance differed on response bias, replicating other studies with both clinical non-clinical samples (see introduction and also meta-analysis by 'Brookwell et al., 2013'). However, they also differed on perceptual sensitivity. This finding replicates the findings in a UK sample reported in Study 2 (Chapter 3), but has not been found in most previous studies, including the first SDT study of hallucinating patients conducted by Bentall & Slade (1985). It is not obvious why this was the case; although there are clear cultural differences between the present Saudi sample and most samples collected elsewhere (mainly in Europe or North America) we had no expectation that these differences would affect sensitivity scores. It should be noted that there were no differences between conditions for sensitivity, indicating that the patients with voices had a general decrement in their ability to detect stimuli that was not affected by the suggestions received. All participants were in receipt of antipsychotic drugs so this is unlikely to be a factor. The groups were also well matched for symptoms other than hallucinations.

However, the primary aim of the present investigation was to determine whether the source monitoring performance of hallucinating patients was affected by suggestions. As expected, a robust effect of suggestions on SDT β scores was observed, resulting in different responses between the two groups. Although both of the groups showed evidence of some effects from the suggestions, these were greater

in the hallucinating group and only this group showed a clear difference between the no voice suggestion condition and the high voice suggestion condition; hence it seems that the hallucinating patients were especially responsive to the suggestion that a large number of voices would be present. Similar results were obtained by Alganami et al. (2017) in a previous analogue study, in which highly hallucination-prone students also responded more to a high voice suggestion condition in comparison with students low in hallucinatory predisposition. Importantly, in the present study, there was also no evidence that these effects were influenced by either paranoia as measured by PaDSp and PANSSp6 scores or the order of suggestion presentation. As a whole, therefore, the results appear to show that, whilst the kind of questionnaire self-report global suggestibility measures such as the IoS seem to correlate reliably with reports of hallucination in patient samples, the responses of hallucinating group to the administration of more specific suggestions involving perceptual and sensory alterations may vary according to the nature and direction of the suggested experiences.

The findings support Bentall's (1990) account of hallucinations, which argues that source-monitoring judgments in both hallucinating patients and ordinary people are influenced by a variety of contextual factors. One way of interpreting the results might be to argue that hallucination patients are more likely to respond to suggestions that most obviously concur with, or endorse, their self-reported predilections to 'see and hear things that are not there'. In other words, relative to non-hallucinating psychotic patients, hallucinating group are more likely to be influenced by suggestions for positive hallucinations than negative hallucinations. This would fit with other studies that have shown an association between measures of hallucination proneness and suggestions that directly or indirectly encourage false positive

responses (for example, Merckelbach & van de Ven, 2001; van de Ven & Merckelbach, 2003; Young et al., 1987). Although Haddock et al. (1995) study using their VTE procedure would appear to be an exception – because hallucinating patients reported less transformation than non-hallucinating patients when they were told that there would be none – it is important to note that, in this study, no actual transformations occurred (hence, the hallucinating patients were not showing a negative hallucination effect but, instead, were responding more accurately than controls).

To our knowledge, this is the first clinical study exploring the source monitoring abnormities in people with psychosis in Saudi Arabia, where the results were similar to those found elsewhere in terms of response bias but not for perceptual sensitivity. There are several important clinical and theoretical implications. In particular, the findings suggest that, at least with respect to response bias, the source monitoring approach to explaining hallucinations appears to be cross-culturally valid. Given that suggestions, and beliefs in general, appear to play a role in source monitoring judgments, it may be useful in the future to explore how cultural belief systems influence these processes and affect hallucinatory symptoms.

This study, nevertheless, has some methodological limitations that should be mentioned. The main limitation is that the most psychotic people enrolled in this investigation had a relatively lower level of education that might conceivably have affected their understanding, knowledge of, and/or their willingness to perform, the computer task (SDT). However, the researcher worked hard to make sure that they understood the instructions and preformed the two-minute practice run prior to the main three runs of the task. Second, the sample employed was modest in size (72), consequently limiting the generalizability of the present study; the findings should

therefore be interpreted with caution and should be replicated in larger patient

samples. Third, a further limitation is that our measure of hallucinations, the PANSS,

measured only current experiences of hallucinations within the sample. Finally, the

instruments used in this study had all been translated from English; we believe that

the translations were conducted competently but it is possible that this may have had

some effects on the results.

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Chapter 5

The relationship between childhood trauma and psychosis-proneness: A study of

Saudi female undergraduates

5.1 Abstract

Background: Traumatic experiences are thought to be related to a range of mental health problems in childhood and, within the psychosis domain, especially hallucinations. However, studies of this association have been mainly conducted in the English-speaking world. The present study aimed to investigate the association between sexual abuse and hallucination proneness in Saudi students, and also to examine whether the effect of childhood trauma on hallucination-proneness is mediated by dissociative experiences.

Methods: 131 university students twice completed a set of six questionnaires measuring hallucination proneness (LSHS-R), suggestibility (IoS), persecution and deservedness (PaDS), dissociative experiences (DES-II), childhood trauma (CTQ) and variety of inner speech (VISQ).

Results: Childhood trauma was associated with both hallucination proneness and paranoia, but sexual abuse was associated with hallucination proneness and not with paranoia. Dissociation partially mediated the effect of childhood trauma on hallucination proneness.

Conclusions: These results are consistent with dissociative accounts of the trauma-hallucination association.

5.2 Introduction

Recent research has challenged traditional understandings of psychosis in two ways. First, psychotic experiences appear to exist on dimensions with healthy functioning (Claridge, 1990), so that many people experience forms of subclinical psychotic states such as hallucinations and delusions (van Os, Hanssen, Bijl, & Ravelli, 2000). One interpretation of these findings is that there is nonetheless a taxon of individuals who are at risk of psychosis, only some of whom develop psychotic symptoms (Meehl, 1989) but recent evidence from taxometric (Haslam, Holland & Kuppens, 2012) and other statistical methods (Bebbington et al., 2013), although not completely consistent, tends to support a fully-dimensional account.

Second, research has shown that there are many social risk factors for psychosis, including economic disadvantage and exposure to urban environments in childhood, childhood traumas such as sexual abuse and other forms of maltreatment and adversity in adulthood (Beards et al., 2013; Bentall et al., 2014). In a recent meta-analysis review (Varese et al., 2012), childhood adversity was associated with substantially increased risk for psychosis in case-control studies (OR= 2.72; 95% CI = 1.90–3.88); population-based cross-sectional studies (OR = 2.99; 95% CI = 2.12–4.20) and also in prospective and quasi-prospective studies (OR = 2.75; 95% CI = 2.17–3.47). The estimated population assigned risk was 33% (16%–47%). Trauma also seems to be associated with the persistence of psychotic experiences (Trotta, Murray, & Fisher, 2015) and there is evidence that the association is as strong for patients with an at-risk mental state for psychosis (Kraan, Velthorst, Smit, de Haan, & van der Gaag, 2015) and for individuals experiencing sub-clinical psychotic symptoms (DeRosse, Nitzburg, Kompancaril, & Malhotra, 2014).

There is controversy about the extent to which specific types of childhood trauma are associated with specific symptoms (Gibson, Alloy, & Ellman, 2016). When Varese et al. (2012) in their meta-analysis, considered particular kinds of trauma, they found that all the types of childhood adversities (e.g., sexual abuse, bullying and neglect) except early separation from parents were associated with psychosis-risk with an OR of 2.8. However, in a series of studies, Bentall and others found a particularly strong indication that childhood adversity is powerfully related to increased risk for psychosis (Bentall, Wickham, Shevlin, & Varese, 2012; Hammersely et al., 2003; Shevlin, McAnee, Bentall, & Murphy, 2015; Sitko, Bentall, Shevlin, & Sellwood, 2014; Wickham & Bentall, 2016). However, using a different analytical approach, a Dutch research group has found no such specific associations (van Nierop et al., 2014) and that trauma was associated with a combination of affective, anxiety and psychosis symptoms that cut across diagnostic boundaries (Nierop et al., 2016).

One way in which this issue may be resolved is by focusing on specific mediating mechanisms that explain how childhood trauma leads to psychotic experiences. Dissociative experiences are a well-recognized consequence of childhood trauma, especially sexual abuse (Dalenberg et al., 2012) and it has been argued that dissociative tendencies processes may play an important role in psychosis (Anketell et al., 2010; Moskowitz & Corstens, 2008). Two recent studies by Perona-Garcelan et al. (2012) and Varese, Barkus, and Bental (2012) found that the association between childhood trauma and hallucination was mediated by dissociative experiences. Moreover, in an experience sampling study, Varese Udachina, Myin-Germeys, Oorschot, and Bentall (2011) found that, in daily life of psychotic patients, the onset of hallucinatory experiences was preceded by the onset of dissociative states. Thompson et

al. (2016) did not find that dissociation mediated the relationship between childhood sexual abuse and transition to psychosis inpatients with an at-risk mental state.

Nearly all of the research on the relationship between trauma and psychosis to date has been conducted in European or North American cultural contexts. On exception is a study by Rajkumar (2015) who found high rates of trauma in a small sample of Indian patients with psychosis; in this sample, total trauma scores were elevated in the patients but relatively low levels of childhood sexual trauma were reported. We are aware of no studies from the Middle East that have addressed this issue.

The primary purposes of this study were, therefore, to carry out a preliminary investigation of the relationship between childhood trauma and psychosis-risk in female Saudi students, but we were also concerned to investigate the reliability of relevant instruments when translated into Arabic as, without sufficient reliability, research on trauma and psychosis in the Saudi Arabia would not be possible. Our specific aims were therefore: (1) to carry out a preliminary analysis of the internal consistency and test-retest reliability of suitable scales after translation into Arabic; (2) to investigate whether the association between childhood trauma and especially CSA and hallucinations holds for women living in Saudi Arabia; (3) to investigate whether, in this sample, dissociation mediates the relationship between CSA and hallucinations. Given previous research indicating an association between suggestibility and psychosis (Alganami, Varese, Wagstaff, & Bentall, 2017; Barkus, Stirling, & Cavill, 2010) we also included a measure of suggestibility in our analyses.

5.3 Method

5.3.1 Participants

175 university female students were recruited for this study from King Abdul-Aziz University in Jeddah, Saudi Arabia. The lack of a comparable male group was

due to cultural barriers preventing the female researcher from gaining access to male students. Only 131 students completed the questionnaires at the second time. The minimum age was 19 and the maximum was 28 (mean age = 21.41; SD = 1.70). Most participants were psychology students. Using G*power software, it was determined that a sample size of this magnitude and five predictor variables would be able to detect an effect size (R^2) of just 0.1 with a power of 0.90.

5.3.2 Measures

5.3.2.1 The revised Launay-Slade Hallucination Scale (LSHS-R; Bentall & Slade, 1985) comprises 12 statements describing clinical ("I often hear a voice speaking my thoughts out aloud") and sub-clinical ("The people in my daydreams seem to true to life that I sometimes think they are") auditory and visual hallucinatory experiences, scored on 5-point Likert scales (anchors: "certainly does not apply to me" – "certainly applies to me"). Scores range from 12 to 60; higher scores represent increased proneness to hallucinations. The scale has excellent internal consistency (e.g. α = .82; Varese et al., 2011); α = .81 on first administration and = .83 on second administration in the present study.

5.3.2.2 The Inventory of Suggestibility (IoS; Ordi & Miguel-Tobal, 1999) is a 22-item assessment of trait suggestibility, comprising four subscales including dreaming (e.g. 'I dream about the things that occur to me or that I would like to experience'), absorption (e.g. 'when I concentrate on something, I become absorbed'), emotional involvement (e.g. 'I cry easily when I watch sentimental movies'), influencing of other (e.g. 'other people´s opinions are very important to me'). Barkus, et al., (2010) used an English translation of the scale with a sample of 230 students and

university staff and reported a total score α coefficient of .82; α = .85 on first

administration and = .86 on second administration in the present study.

5.3.2.3 The Persecution and Deservedness Scale (PaDS; Melo, Corcoran,

Shryane, & Bentall, 2009) is a 10-item self-report measure. The persecution subscale

includes statements with persecutory content (e.g., ''I'm often suspicious of other

people's intentions towards me?''), where subjects are required to rate on a 5-point

Likert scale (0 ''certainly false'' to 4 ''certainly true''). The α coefficient for the scale

of .87 was reported by Varese, Barkus, and Bentall (2011) For PaDSp, it was = .80 on

first administration and = .81 on second administration in the present study.

5.3.2.4 The Dissociative Experience Scale-II (DES-II; Carlson & Putnam,

1993) is a 28-item, self-report measure assessing the frequency of clinical and non-

clinical dissociative phenomena, rated between 0 to100; Scores range from 0 to 2800.

The scale has reported α coefficient of .95 (Bernstein et al., 1993); α = .92 on first

administration and = .93 on second administration in the present study.

5.3.2.5 The Childhood Trauma Questionnaire (CTQ; Bernstein and Fink, 1998)

is a self-report scale consisting of 28 items; we used the modified version, which

included **25 items** extracted from the original (see Wright et al., 2001 for more details).

It is designed to evaluate 5 types of childhood traumatic experiences (i.e., emotional,

physical, and sexual abuses, emotional and physical neglects). Items on the CTQ are

rated on 1 (never) to 5 (very often) likert scale. Scores range from 5 to 25 for each type

of abuse. The CTQ has demonstrated excellent test-retest reliability with values ranging

from .79 to .81 (Bernstein & Fink, 1998), and was =.89 on both the first and second

administrations in the present study.

5.3.2.6 The quality of inner speech questionnaire (VISQ; McCarthy-Jones &
Fernyhough, 2011) is a questionnaire consisting of 18 items addressing dialogic,

condensed and evaluative/motivational properties of inner speech, in addition to the

presence of other people's voices in inner speech scale are rated on a 1 (Certainly does

not apply to me) to 6 (Certainly applies to me) likert scale. Total cores range from 18 to

108. . Each subscale has satisfactory internal reliability, and test re-test reliability. The

α coefficient for the scale was .83 on first administration and = .85 on second

administration in the present study.

5.3.3 Method of translation

The six chosen questionnaires were translated into Arabic by the researcher

whose first language is Arabic. The scales were then back translated into English by

two Saudi PhD psychology students, one studying in England, and the other in

Canada. Before the final stage, the back translated version was minimally revised by

Prof. Bentall, the researcher's supervisor. The final Arabic version of the scales were

checked by Dr. Arwa Arab (head of the Department of Psychology at King Abdu-

Aziz University, who gained her PhD degree in Child clinical psychology from the

University of Southampton, England). Finally, the scales were piloted on 10 Saudi

students to verify ease of comprehension.

5.3.4 Procedure

Lecturing staff at the Department of Psychology at Kind Abdu-Aziz

University distributed the questionnaires to students, and provided time during their

lectures for the scales to be completed. Each lecturer then distributed the

questionnaires a second time between 2 and 3 weeks later. 44 students did not

complete the questionnaires a second time because they were absent from their classes.

5.4 Results

5.4.1 Reliability of measures

Internal consistencies (Cronbach's Alpha) for the six scales items were given in the measures section (above) and varied between .80 and .93. Correlational analyses also revealed a strong and significant correlation between first and second administrations of each scales/subscale total scores, ranging from r = .80 to r = .98 (see Tables 5.1- 5.5). When a paired sample t-test was performed between time one and time two, no difference was found for the total scores of the six questionnaires expect a minor difference was found for LSHS-R (also shown in Tables 5.1- 5.5). For all subsequent analyses, scores averaged between the two test points were used.

5.4.2 Correlational analyses

LSHS-R and PaDSp scores were highly correlated, r = .44, *p* < .001. Total childhood trauma scores correlated with hallucination proneness, r = .46, *p* < .001, but less strongly with paranoia, r = .21, *p* < .05. Using the specific sexual abuse CSA scores, there was only an association with hallucination proneness, r = .49, *p* < .001 and not with paranoia, r = .02, *p* = .78. Partial correlations between the trauma scores and hallucination proneness survived controlling for paranoia, r = .42, *p* < .001 for total scores and r = .54, *p* < .001 for CSA, but the associations between total trauma and paranoia did not survive controlling for hallucinations, whereas the association between CSA and paranoia did r = -.25, *p* < .01.

Total trauma scores and sexual abuse scores correlated with IoS scores, r = .30, *p* < .001 and .29, *p* < .001 respectively, and even more strongly with DES-II

scores, r = .44, p < .01 and r = .33, *p* < .001, but only with the other people in inner speech subscale of the VISQ, r = .30, *p* < .001 and r = .28, *p* < .001; there were no associations between the trauma variables and the other VISQ scores.

LSHS-R scores correlated with IoS scores, r = .54, *p* < .001, DES-II scores, r = .16, *p* < .001, VISQ inner dialogue scores, r = .46, *p* < .001, VISQ other people in inner speech, r = .60, *p* < .001 and VISQ motivational inner speech, r = .30, *p* < .001. These associations survived controlling for paranoia in the case of the IoS, r = .43, *p* < .001, DES-II, r = .52, *p* < .001, other people in inner speech, r = .52, *p* < .001 and motivational inner speech, r = .24, *p* < .00

Table 5.1

Correlational and t-test analyses of the Arabic version of the 6 questionnaires.

Questionnaires	Time one	Time two	r	*p*	t	*p*
	N= 131	**N= 131**				
LSHS-R	M= 29.52 (8.17)	M= 28.89 (7.87)	.97	< .001	3.78	< .001
PaDSp	M= 14.73 (6.81)	M= 41.21 (6.67)	.94	< .001	0.81	= .418
IoS	M= 40.97 (11.53)	M= 29.52 (8.17)	.94	< .001	0.81	= .417
DES-II	M= 614.27	M= 608.02	.98	< .001	0.99	= .326
	(344.97)	(338.91)				
CTQ	M= 41.10 (12.46)	M= 40.63 (11.65)	.95	< .001	1.22	= .224
VISQ	M= 59.18 (12.95)	M= 58.76 (13.14)	.92	< .001	0.91	= .367

Note: LSHS-R= the revised Launay-Slade Hallucination Scale, *PaDSp*= the persecution subscale of Persecution and Deservedness Scale, *IoS*= Inventory of Suggestibility, *DES-II*= Dissociative Experience Scale, *CTQ*= Childhood Trauma Questionnaire, *VISQ*= Verity of Inner Speech Questionnaire.

Table 5.2

Correlational and t-test analyses of the IoS sub-scales.

Sub-Scales of IoS	Time one	Time two	R	*p*	T	*p*
Dreaming	M= 7.51 (3.12)	M= 7.43 (3.15)	.85	< .001	0.56	= .579
Absorption	M= 9.24 (2.40)	M= 9.01 (2.23)	.80	< .001	1.78	= .077
Emotional involvement	M= 8.59 (3.70)	M= 8.28 (3.58)	.88	< .001	1.99	< .05
Influence by others	M= 8.22 (3.18)	M= 8.65 (3.10)	.80	< .001	-2.47	< .05

Table 5.3

Correlational and t-test analyses of the DES-11 sub-scales.

Sub-Scales of DES-II	Time one	Time two	r	*p*	t	*p*
Absorption	M= 289.85 (142.03)	M= 283.36 (133.58)	.95	< .001	1.60	= .112
Amnesia	M= 127.41 (109.90)	M= 125.42 (104.16)	.95	< .001	0.68	= .498
Depersonalization	M= 75.19 (75.65)	M= 77.86 (79.73)	.94	< .001	1.14	= .255

Table 5.4

Correlational and t-test analyses of the CTQ sub-scales.

Sub-Scales of CTQ	Time one	Time two	R	p	t	p
Physical abuse	M= 6.72 (3.13)	M= 6.67 (2.76)	.90	< .001	0.38	= .705
Sexual abuse	M= 6.98 (3.29)	M= 7.02 (3.35)	.98	< .001	-0.47	= .639
Emotional abuse	M= 8.44 (3.44)	M= 8.38 (3.01)	.90	< .001	0.47	= .640
Emotional neglect	M= 10.43 (4.20)	M= 10.40 (4.14)	.87	< .001	0.12	= .902
Physical neglect	M= 8.53 (2.98)	M= 8.21 (2.71)	.81	< .001	2.10	< .05

Table 5.5

Correlational and t-test analyses of the VISQ sub-scales.

Sub-Scales of VISQ	Time one	Time two	r	p	t	p
Dialog inner speech	M= 15.08 (4.97)	M= 14.40 (4.61)	.88	< .001	3.25	< .01
Condensed inner speech	M= 15.53 (3.71)	M= 15.64 (3.79)	.82	< .001	-0.58	= .563
Other-people in inner speech	M= 11.08 (5.05)	M= 11.41 (5.26)	.87	< .001	-1.45	= .150
Evolutional/motivational inner speech	M= 17.49 (4.48)	M= 17.31 (4.29)	.88	< .001	0.97	= .335

Similar correlations were found for associations between paranoia and IoS

scores, r = .41, $p < .001$, DES-II scores, r = .43, $p < .001$, and all of the VISQ

subscales, maximum r = .37, $p < .001$, minimum r = .20, $p < .05$. However,

controlling for LSHS-R scores, significant associations remained for both the IoS, r =

.23, $p < .01$, and the DES-II, r = .22, $p < .05$, but for none of the VISQ variables.

5.4.3 Regression analyses

We tested regression models with LSHS-R scores as the dependent variable.

Trauma scores were entered in a first step and then IoS, DES-II and other people in

inner speech scores (VISQ-other people) and motivational inner speech (VSIQ-

motivation) were added to the model. At the first stage, trauma scores predicted LSHS-

R scores, $F(1,130) = 34.16$, $p < .001$, adjusted $r^2 = .20$. Adding the psychological

variables however improved the model significantly, $F_{change}(4,125) = 27.98$, $p < .001$.

The final model accounted for 58% of the variance in LSHS-R scores, $F(5,130) =$

34,93, $p < .001$. The contribution of trauma fell from ß= .46, $p < .001$ in the first stage

to ß = .20, p < .01 in the second stage. At the second stage, IoS scores, ß = .25, p <

.001, DES-II scores, ß = .23, $p < .01$ and VISQ-other people scores, ß = .32, $p < .001$

were all significant predictors, but not VISQ-motivation, ß = .09, $p = .173$.

In the same analyses using sexual abuse scores as the predictor variable,

comparable results were obtained. In the first stage, CSA predicted LSHS-R scores,

$F(1,130) = 41.50$, $p < .001$, adjusted $r^2 = .24$. Adding the psychological variables led to

a significant improvement in the model, $F_{change}(4,125) = 29.12$, $p < .001$, and a

significant final model, $F(5,130) = 38.93$, $p < .001$, accounting for 59% of the variance.

Between the first and second model, the association between CSA and LSHS-R scores

dropped from ß = .49, $p < .001$ to ß = .26, $p < .001$, suggesting partial mediation by IoS

scores, ß = .24, *p* < .001, DES-II scores, ß = .24, *p* < .001, and other people in inner

speech, ß = .31, *p* < .001, but not by motivational inner speech, ß = .07, *p* = .256.

5.4.4 Mediation analysis

We used PROCESS model 4 (Hayes, 2013) with 1,000 bootstrapped samples to

formally test for mediation between total childhood trauma and LSHS-R scores,

entering IoS, DES-II and VISQ-other scores as mediators and using PADSp scores as a

covariate acting on both the mediators and the LSHS-R scores. The results, shown in

Table 5.6, indicate evidence of partial mediation by all three of the mediators. When the

analysis was repeated with CSA as the independent variable, the mediation effects were

stronger.

Table 5.6

Results from PROCESS mediation analyses (LCI = lower 95% confidence interval, UCI = upper 95% confidence interval).

Variables	Direct effect on LSHS-R				Indirect effect on LSHS-R		
	Effect	SE	t	LCI - UCI	Effect	Boot SE	Boot LCI - UCI
CTQ Total	.12	.04	2.66 **	(.0296 - .2020)	.14	.03	(.0804 - .2186)
DES-II					.05	.02	(.0126 - .1063)
IoS					.04	.02	(.0154 - .0767)
VISQ-other people					.05	.02	(.0136 - .1030)
CSA Total	.67	.15	4.50 ***	(.3727 - .9587)	.50	.13	(.2771 - .8020)
DES-II					.16	.08	(.0425 - .3416)
IoS					.15	.06	(.0536 - .2988)
VISQ-other people					.20	.08	(.0790 - .4194)

Note: SE= Standard Error, *Boot*= bootstrap, ***p*< 0.01, ****p*<0.00

5.5 Discussion

Our findings on the internal consistency and reliability of the scales suggest that our translation procedures were successful, and that the scales can be used with an Arabic-speaking population. The validity of the translated scales is suggested by the similar results obtained to those obtained from English-speaking samples.

We found a strong relationship between hallucination proneness, paranoid ideation, suggestibility and dissociative experiences, as previously found with English-speaking student populations (e.g., Alganami et al., 2017; Barkus et al., 2010). With respect to the VISQ, the results are a bit more complex. McCarthy-Jones and Fernyhough (2011) found that only dialogic inner speech predicted auditory hallucination proneness as measured by the LSHS-R. However, de Sousa, Sellwood, Spray, Fernyhough, and Bentall (2016) found that actual hallucinatory experiences in a clinical sample were associated with other people in inner speech as found in the present study.

Perhaps our most important finding was that hallucination proneness was strongly associated with childhood trauma, as found in studies conducted in the English speaking world, both with analogue samples (Morrison, & Petersen, 2003; Perona-Garcelán et al., 2014; Varese et al, 2011) and also clinical samples (e.g., Perona-Garcelán et al., 2012; Varese et al., 2012). The present results therefore suggest that these associations are cross-culturally valid and can be found in countries with very different social attitudes to those found in the English-speaking world.

It is difficult to make precise comparisons between the rates of trauma reported in this sample of Saudi students, and other Saudi and non-Saudi samples. However, in a Saudi sample of nearly 17,000 adolescents aged between 15 and 19 the prevalence of various forms of childhood adversities in the year before the 2012 assessment ranged between 10%

(for sexual abuse) and 65% (for exposure to violence) (Al-Eissa et al., 2016). Greater rates of all types of abuse were found when children lived with only one parent in comparison with both, and rates for exposure to violence, psychological abuse and neglect were significantly greater for girls, whereas exposure to sexual abuse was greater for boys. A British study of young people found that 7.2% of females aged 11-17 and 18.6% of females aged 18-24 reported childhood experiences of sexual victimization by any adult or peer that involved physical contact, varying from sexual touching to rape (Radford, Corral, Bradley, & Fisher, 2013). In the present sample of 131 young Saudi female university students, 35% reported sexual abuse, but, of course, in the majority of cases, this will reflect very low level of abuse.

Generally, therefore, the present findings support recent accounts suggesting that the trauma-hallucinations link might be explained by dissociative experiences (Anketell et al., 2010; Moskowitz & Corstens, 2008; Varese et al., 2012) and are consistent with epidemiological and cross-sectional studies which have reported a specific association between sexual abuse and hallucinations (Hammersley et al., 2003; Read & Argyle, 1999; Read, Agar, Argyle, & Aderhold., 2003; Read, Os, Morrison, & Ross, 2005; Shevlin, Dorahy, & Adamson, 2007; Varese et al., 2012).

A difference from previous studies is that we included a quality of inner speech measure and also a measure of suggestibility in our meditational model. This was justified by previous findings that these variables were related to hallucinations (Barkus et al.; 2010; de Sousa et al., 2016) but also by our regression analyses that suggested that these variables independently predicted hallucination proneness. In fact, these psychological variables were moderately correlated in our sample (r^2 = .288 - .531, all $p < .001$), raising the possibility that they were indices of a common underlying process.

Previous research has found that dissociation and suggestibility are multifaceted experiences, which are strongly related in most samples (e.g., Eisen & Carlson, 1998). The fact that the suggestibility and dissociation scores were strongly associated not only in this but also previous studies of hallucination proneness (Alganami et al., in press; Barkus et al., 2010), suggests that they may tap common psychological processes. Indeed, both scales can be broken into subscales which, for both, include a subscale for absorption although, confusingly, the two absorption subscales were not highly correlated (r = .28 at time 1 and .30 at time two). In this context, it should be noted that the presence of other people in inner speech might also be thought to be a dissociative phenomenon, given classic accounts of dissociation as involving a division of consciousness (Hilgard, 1974). A major limitation of research in this area is that dissociation is defined purely in phenomenological terms; there is, at present, very little understanding of the neurocognitive processes involved and the present findings illustrate the need to develop such an understanding.

Some methodological limitations of this study should be acknowledged. First, hallucination proneness, childhood trauma and other variables were assessed using retrospective self-report measures rather than a face to face interview, which might conceivably have undermined the validity of their responses. However, previous evidence from the English-speaking world suggests that reports of childhood trauma are generally accurate when compared to alternative sources of evidence, although when childhood victims of sexual abuse have been followed-up a tendency to under-report has been noted (Widom & Morris 1996, 1997); any such under-reporting would have reduced the ability to of the study to detect significant associations. In the case of patients with psychosis, it has been shown that reports of abuse generally concord with those of third-parties (sibs) and are stable at follow-up after recovery from psychotic symptoms (Fisher et al., 2011).

The participating university students were reported by their lecturers to have filled in the six questionnaires with interest and enthusiasm. Of course, as the childhood trauma questionnaire (CTQ) asked about some very unpleasant experiences in early childhood, it might have made the female participants feel shame at reporting such painful and embarrassing past experiences, especially as these experiences are not overtly discussed in a Muslim Saudi society. Nonetheless with the development of the open-minded thinking and the encouragement to talk in the society within the last two decades, women are becoming more likely to express their feelings and concerns. Another main limitation is the lack of comparable male group, which reduced our ability to form a decisive picture of the role of childhood trauma in hallucination proneness in young Saudi people. Therefore, replicating this study with Saudi males would enrich the present findings.

Acknowledging that trauma is an important risk factor for hallucinations (Hardy et al., 2005; Thompson et al., 2010) that influences individuals' evaluations of these experiences (Andrew, Gray, & Snowden, 2008) has important implications for psychiatric services and society. In the case of patients, there is a need for more comprehensive investigation of past traumatic events and the assessment of the impact of childhood adversities. The present findings also emphasise the need to study childhood adversity in very different cultural settings from Western cultures.

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Chapter 6

The relationship between childhood trauma and psychosis: A study of Saudi psychotic patients

6.1 Abstract

Background: Traumatic experiences are thought to be related to a variety of mental health complications in childhood and adulthood, especially hallucinations. However, studies of this association have been mainly conducted in the English-speaking world. The present study aimed to investigate the association between sexual abuse and hallucination in Saudi psychotic patients, and also to examine whether the effect of childhood trauma on hallucination is mediated by dissociative experiences.

Methods: Seventy-two hallucinating and non-hallucinating psychotic patients completed a set of **7** measures, including the Positive and Negative Syndrome Scales, the Beck Depression Inventory-II, the Persecution and Deservedness Scale, the Dissociative Experiences Scale-II, the Childhood Trauma Questionnaire and the Variety of Inner Speech Questionnaire.

Results: Childhood trauma was associated with both hallucination and paranoia, but sexual abuse was associated with hallucinations and not with paranoia. Dissociation partially mediated the effect of childhood trauma on hallucination.

Conclusions: These results are consistent with dissociative accounts of the trauma-hallucination association.

6.2 Introduction

Childhood adverse events including trauma are common experiences worldwide, with estimates that nearly a third of the general population might be affected (Kessler et al., 2010, Spataro, Mullen, Burgess, Wells, & Moss, 2004). A recent investigation in the UK has found that about 11% of the population has experienced childhood sexual abuse and about 24% physical abuse (May-Chahal & Cawson, 2005).

Research has shown that childhood trauma is one of many social risk factors for psychosis, which also include early separation from parents, economic disadvantage and exposure to urban environments at an early age, migration, and adversities such as victimization in adulthood (Beards et al., 2013; Bentall et al., 2014). In a recent meta-analysis (Varese et al., 2012), childhood adversity (sexual abuse, physical abuse, early separation from parents and bullying by peers) was associated with substantially increased risk for psychosis in case-control studies (OR= 2.72; 95% CI = 1.90–3.88) population-based cross-sectional studies (OR = 2.99; 95% CI = 2.12–4.20) and also in prospective and quasi-prospective studies (OR = 2.75; 95% CI = 2.17–3.47). The estimation of the population attributable fraction was 33% (16%–47%).Trauma also appears to be important during all phases of psychosis; it is linked with the persistence of psychotic experiences (Trotta, Murray, & Fisher, 2015) and is associated with symptoms in patients with an at-risk mental state for psychosis (Kraan, Velthorst, Smit, de Haan, & van der Gaag, 2015; Thompson et al., 2013) and individuals experiencing sub-clinical psychotic symptoms (DeRosse, Nitzburg, Kompancaril, & Malhotra, 2014).

There has recently been debate about whether specific types of childhood adversity have effects on pathways that lead to specific symptoms (Bentall et al., 2014;

Gibson, Alloy, & Ellman, 2016). In Varese et al.'s (2012) meta-analysis, all forms of childhood trauma except early separation from parents were related to psychosis-risk. However, in a series of studies, Bentall and others found a particularly strong indication that childhood sexual abuse is especially strongly associated with increased risk for hallucinations (Bentall, Wickham, Shevlin, & Varese, 2012; Hammersely et al., 2003; Shevlin, McAnee, Bentall, & Murphy, 2015; Sitko, Bentall, Shevlin, & Sellwood, 2014; Wickham & Bentall, 2016). However, using a different analytical approach, a Dutch research group did not find such specific associations (van Nierop et al., 2014), instead reporting that trauma was related to a combination of affective, anxiety and psychosis symptoms that cut across diagnostic boundaries (Nierop et al., 2016).

One way in which this issue may be resolved is by focusing on specific mediating mechanisms that explain how childhood trauma leads to psychotic experiences. Dissociative experiences are a well-recognized result of childhood trauma, especially sexual abuse (Dalenberg et al., 2012) and it has been argued that dissociative processes play an essential role in psychosis, especially hallucinations (Anketell et al., 2010; Moskowitz & Corstens, 2008). Two recent studies by Perona-Garcelan et al. (2012) and Varese, Barkus, and Bentall (2012) found that the association between childhood trauma and hallucination was mediated by dissociative experiences. Moreover, in an experience sampling study, Varese Udachina, Myin-Germeys, Oorschot, and Bentall (2011) found that, in daily life of psychotic patients, the onset of hallucinatory experiences was preceded by the onset of dissociative states. These findings were interpreted in the context of the source-monitoring model of auditory hallucinations, which suggests that these experiences occur when self-generated inner speech is misattributed to an external source (Bentall, 1990). According to Varese et al.

(2012), impaired source monitoring and dissociation separately contribute to the failure to discriminate between inner speech and external speech that leads to AVHs.

Almost all of the research on the association between trauma and psychosis to date has been conducted in European or North American cultural contexts. An exception is a study by Rajkumar (2015), which found high rates of trauma in a small sample of Indian psychotic patients; in this sample, total trauma scores were elevated in the patients but relatively low levels of childhood sexual trauma were recorded. We are aware of no studies from the Middle East that have addressed this issue. However, in a recent analogue study of healthy female Saudi university students (Alganami & Bentall, in preparation; Chapter 5) we found that reports of childhood trauma, especially sexual abuse, were associated with hallucination-proneness as measured by the Launay Slade questionnaire (Launay & Slade, 1981), and that this association was mediated by both dissociative experiences as measured by the Dissociative Experiences Scale-II (Carlson & Putnam, 1993) and the presence of other people in inner speech as measured by the Varieties of Inner Speech Questionnaire (McCarthy-Jones & Fernyhough, 2011).

The primary aims of the present study was, therefore, to investigate the relationship between childhood trauma and hallucinations in Saudi patients suffering from psychosis. Specifically, our aims were: (1) to investigate whether the association between childhood trauma and especially CSA and hallucinations holds for psychotic patients living in Saudi Arabia; (2) to investigate whether, in this sample, dissociation and the presence of others in inner speech mediates this relationship.

6.3 Method

6.3.1Participants

Patients were recruited from Mental Health Hospital in Jeddah, Saudi Arabia (aged between 18 - 60 years, M_{age} = 36.09 and SD = 10.18; 47 male '65%' and 25 female '35%'). Patients judged to lack mental capacity to consent by their care team or by the researcher, and patients' for who Arabic is not their first language were excluded before being approached. Seventy-two patients with the diagnosis of schizophrenia spectrum disorder agreed to take part, out of 101 patients who were initially approached. Those who were not included were dropped from the study for one of the following reasons: unwillingness to perform the SDT task; poor communication or acute thought disorder; or because they were discharged from the hospital before testing could be completed. One male patient was excluded after he reading the information sheet and refusing to sign the consent form on the grounds that the two of researchers' names were English and that he did not accept to work with foreigners.

Sample size calculations using G*power software indicated that, with 72 participants and 4 predictor variables (the maximum used in any of the models tested), the study has a power of 0.70 to detect an effect size of 0.15, and a power of 0.85 to detect an effect size of 0.20.

Sixty patients had received from their clinicians a diagnosis of schizophrenia (83%), 9 were diagnosed with schizoaffective disorder (13%), and 3 were diagnosed with delusional disorder (4%). Thirty-eight (53%) of the patients were hearing voices whereas 34 (47%) were not during the week of the two-session meetings. There was no difference between hallucinating and non-hallucinating patients for age, $t(70)$ = .28, p = .78, or gender composition $\chi^2(1, N= 72)$ =2.69, p = .10. All patients were approached and informed about the study by someone involved in their care (e.g., their psychiatrists, psychologists or nurses) and, before the study commenced.

Ethical review for the study was obtained from the University of Liverpool Research Ethics Committee in the UK, reference no: RETH000736 and from the hospital Committee of Scientific Research Ethics, reference no: H-02-J-002 (which is registered with the National Committee of Bio and Medical Ethics) in Jeddah, Saudi Arabia. (Because the patients were from outside the UK, approval from an NHS Ethics Committee was inappropriate. The Saudi National Committee of Bio and Medical Ethics interviewed the researcher to ensure the safety and right of the psychotic patients included in this research, and to determine that the research would not disrupt the provision of clinical services.)

6.3.2 Measures

6.3.2.1 The Positive and Negative Syndrome Scale (PANSS: Kay, Opler, & Fiszbein, 1987) is a 30 item semi-structured interview of psychotic symptomatology, assessing three demotions: positive symptoms, negative symptoms, and general psychopathology. Each item is scored on a 7-point Likert scale where a score of 1 represents 'minimal' symptoms and a score of 7 represents 'extreme' symptoms. Seven items assess positive symptoms, seven items measure negative symptoms and the remaining sixteen items test general psychopathology. PANSS has demonstrated good evidence of reliability, criterion-related validity, and construct validity (Kay, Opler, & Lindenmayer, 1988), and Cronbach's Alpha = .81 in our sample. Before administering the PANSS, the lead investigator received training on the PANSS in the UK.

6.3.2.2 The Persecution subscale of the Persecution and Deservedness Scale (PaDSp; Melo, Corcoran, Shryane, & Bentall, 2009) is a 10-item self-report measure assessing persecutory content (e.g., ''I'm often suspicious of other people's intentions towards me?''), rated on a 5-point Likert scale (0 ''certainly false'' to 4 ''certainly

181

true''). The α coefficient for the scale of .87 was reported by Varese, Barkus, and Bentall (2011), and it = .82 the present sample.

6.3.2.3 The Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996) measures 21 depressive symptoms and attitudes, rated from 0 'none or minimal' to 3 'severe'. The BDI-II has high internal consistency (reported as.93 by Beck et al., 1996), and α = .88 in our sample.

6.3.2.4 The Dissociative Experience Scale-II (DES-II; Carlson & Putnam, 1993) is a 28-item, self-report measure assessing the frequency of clinical and non-clinical dissociative phenomena, each rated between 0 to 100. The scale has a reported α coefficient of .95 (Bernstein et al., 1993); α = .89 in our sample.

6.3.2.5 The Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998) is a self-report scale consisting of 28 items; we used the modified version, which included **25** items extracted from the original (see Wright et al., 2001 for more details). It is designed to evaluate 5 types of childhood traumatic experiences (emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect). Items on the CTQ are rated on a 1 (never) to 5 (very often) likert scale. Scores range from 5 to 25 for each type of abuse. The CTQ has demonstrated excellent test-retest reliability with values ranging from .79 to .81 (Bernstein & Fink, 1998), and α = .85 in our sample.

6.3.2.6 The quality of inner speech using the verity of inner speech questionnaire (VISQ; McCarthy-Jones & Fernyhough, 2011) is a questionnaire consisting of 18 items addressing dialogic, condensed and evaluative/motivational properties of inner speech, in addition to the presence of other people's voices in inner speech. Items are rated on a 1 (Certainly does not apply to me) to 6 (Certainly applies to me) likert scale. Total cores range from 18 to 108. . Each subscale has satisfactory

internal reliability, and test re-test reliability. The α for all the 18 items = .91 in our sample, the α for the subscales; dialogical inner speech = .68, condensed inner speech = .82, other people in inner speech = .96, and motivational inner speech = .57. Guidelines on the practical and clinical significance of the alpha coefficient have been published by Cicchetti and Sparrow (1981), Fleiss (1981) and also Landis and Koch (1977). Summarising these, Cicchetti (1994) states that:

> "When the reliability coefficient is below .40, the level of clinical significance is poor; when it is between .40 and .59, the level of clinical significance is fair; when it is between .60 and .74, the level of clinical significance is good; and when it is between .75 and 1.00, the level of clinical significance is excellent" (Cicchetti, 1994, p. 286).

> However, other authors, for example Bland and Altman (1999) argue that alpha coefficients must be above 0.7 to be satisfactory.

> For the Arabic version of VISQ, according to Cicchetti's guideline, the motivational inner speech scale achieved only fair reliability, dialogical inner speech achieved good reliability, and condensed inner speech and other people in inner speech achieved excellent reliability. However, according to Bland and Altman's advice, the alpha coefficient for motivational inner speech is clearly not satisfactory.

6.3.3 Method of translation and procedure

Questions from the structured interview for PANSS were translated into Arabic by the researcher whose first language is Arabic, and then independently back translated into English by a bilingual psychology PhD student. The edited Arabic version was then further revised by the researcher in a collaboration with a psychiatrist and a psychologist at the Mental Health Hospital where the study took

place, to ensure its acceptability to Saudi patients with a diagnosis of schizophrenia spectrum disorder. (For other scales refer to the Saudi students study; **method** section, Chapter 5). The procedure of how patients filled in the questionnaires was outlined in ***procedure and summary of design;*** in part one of this clinical patient study (Chapter 4).

6.4 Results

6.4.1 Comparing the two patient groups on the scales

Group data are shown in Table 6.1. Independent-Samples t-test on the PANSS subscales scores revealed difference on only the positive symptomology subscale; there were no differences on negative symptoms or general psychopathology. For total score and subscales scores of CTQ, the only difference between hallucinating and non-hallucinating patients was observed on sexual abuse, whereas the other four subscales and total scores did not differ between the two patients groups.

The four subscales of VISQ were all significantly different between the two groups. For DES-II, the total scores and the subscales scores were all significantly different except for amnesia subscale, which did not differ between the hallucinating and non-hallucinating patients. BDI-II was significantly different, but PaDS-persecution did not differ between the groups.

6.4.2 Correlational analyses

We used PANSS-p3 a measure of hallucination severity. PaDSp and PANSS-p3 was not related r = -.03, p =.830. However, BDI-II and PANSS-p3 were significantly related r =.31, p <.01. PANSS-p3 scores correlated with DES-II total scores, r =.48, p < .001, DES-II depersonalization r =.70, p <.001, and DES-II absorption, r =.29, p <05, VISQ inner dialogic scores, r =.42, p <.001, VISQ inner condensed scores, r =.64, p

<.001, VISQ other people in inner speech, r =.85, *p* <.001 and VISQ motivational inner speech, r =.48, *p* <.001. All these associations survived controlling for paranoia and/or depression in all cases.

No association was found between paranoia and DES-II total or the two subscales of depersonalization and absorption, or any of the four VISQ subscales. The same results were found when controlling for hallucinations except for the association between DES-II depersonalization and PaDSp r =.27, which were significant *p* <.05.

Table 6.1

Mean and standard deviation of the scales and the subscales which significantly differed between the two patients' groups.

Scales	Hallucinating (n = 38)	Non-hallucinating (n = 34)
PANSS-Positive symptom	22.61 (3.78)**	19.85 (4.00)
CTQ-SA	8.95 (4.20)***	6.21 (1.68)
VISQ-Dialogic	14.87 (1.85)***	13.06 (2.51)
VISQ-Condensed	21.00 (2.34)***	15.76 (3.45)
VISQ-Other people	24.87 (2.97)***	11.97 (5.05)
VISQ-Motivation	17.79 (1.58)***	15.62 (2.07)
DES-II-Total	1025.80 (226.48)***	790 (264.78)
DES-II-Absorption	387.63 (85.34)*	338.82 (100.96)
DES-II-Depersonalization	246.05 (75.61)***	131.18 (56.66)
BDI-II-Total	20.65 (7.53)**	15.26 (6.30)

*Note: * = p < .05, ** = p ≤ .01, ***= p ≤ .001*

However significant associations were found between depression and DES-II total only, r = .24, *p* < .05, and only VISQ other people in inner speech, r = .29, *p* < .05. Controlling for PANSS-p3 scores, revealed significant associations only between depression and VISQ inner dialogic speech, r =.-25, *p* < .05, and between depression and DES-II-amnesia r =.28, *p* <.05.

Total childhood trauma scores correlated with hallucinations, r =.26, *p* <.05, and with paranoia, r =.30, *p* <.05. Using the specific sexual abuse CSA scores, there was only an association with hallucinations, r =.43, *p* <.001 and not with paranoia, r =17, *p* =.150; no-other subscales of trauma were related to hallucinations.

Partial correlations between trauma and hallucinations survived controlling for paranoia, r =.28, *p* <.05 for total scores and r =.44, *p* <.001 for CSA scores. The associations between the trauma total scores and paranoia, r =.33, *p* <.01 survived controlling for hallucination. Partial correlations between the trauma total scores and hallucinations did not survive controlling for depression, r =.19, *p* =.111, but there was still an effect for CSA scores r =.42, *p* <.001. The associations between either the trauma total or CSA scores and depression did not survive controlling for hallucinations.

Total trauma scores correlated strongly with DES-II total scores, r =.37, *p* <.01, and with both DES-II depersonalization r =.36, *p* <.01, and DES-II absorption, r =.30, *p* <.05. However, there was no association between the trauma total scores and the VISQ variables. CSA scores correlated with DES-II total scores, r =.24, *p* <.05, and more strongly with DES-II depersonalization r =.43, p <.001. CSA scores also correlated with VISQ inner dialogue scores, r =.27, *p* <.05, and more strongly with VISQ other people in inner speech, r =.38, *p* ≤ .001.

186

6.4.3 Regressions analyses

We tested regression models with PANSS-p3 scores as the dependent variable. Total trauma scores were entered in a first step and then DES-II total scores were added to the model. At the first stage, trauma scores predicted PANSS-p3 scores, $F(1,71) = 5.11$, $p <.05$, adjusted $r^2 =.06$. Adding the DES-II variable however improved the model significantly, $F_{change}(1,69) = 15.15$, $p <.001$. The final model accounted for 24% of the variance in PANSS-p3 scores, $F(2,71) = 10,65$, $p <.001$. The contribution of trauma fell from a significant ß =.26, $p <.05$ in the first stage to a non-significant ß =.10, $p =.380$ in the second stage; the strong association between PANSS-p3 and DES-II scores in this second stage, ß =.44, $p <.001$, suggested that dissociation mediated the relationship between childhood trauma and hallucinations.

In a similar analysis using sexual abuse scores as the predictor variable and including in the second stage the VISQ variables that significantly correlated with CSA, similar results were obtained. In the first stage, CSA predicted PANSS-p3 scores, $F(1,71) = 16.07$, $p < .001$, adjusted $r^2 =.18$. Adding the psychological DES-II, and VISQ-other people and dialogic inner speech variables led to a significant improvement in the model, $F_{change}(3,67) =48.26$, $p <.001$, and a significant final model, $F(4,71) =48.34$, $p <.001$, accounting for 74% of the variance. Between the first and second model, the association between CSA and PANSS-p3 scores dropped from a significant ß =.43, $p <.001$ to a non-significant ß =.11, $p =.109$, suggesting a mediational role only by other people in inner speech, ß =.73, $p <.001$, whereas, the effect of DES-II did not; when it only approached a statistical significance ($p = .08$).

6.4.4 Mediation analysis

We used PROCESS model 4 (Hayes, 2013) with 1,000 bootstrapped samples to formally test for mediation between total childhood trauma and PANSS-p3 scores, entering DES-II scores as mediator and using PADSp scores as a covariate acting on both the mediator and the PANSS-p3 scores. The direct effect was not significant, but the indirect effect was. When the analysis was repeated with CSA as the independent variable with VISQ-other people serving as the mediator using PADSp scores again as a covariate acting on both the mediators and the PANSS-p3 scores, the direct effect was also not significant, but the indirect effects were. The results, shown in Table 6.2, indicate evidence of mediation by the DES-II on total CTQ scores, and in case of CSA scores the mediation effects of VISQ-other people was stronger.

Table 6.2

Results from PROCESS mediation analyses (LCI = lower 95% confidence interval, UCI = upper 95% confidence interval).

	Direct effect on PANSS-p3				**Indirect effect on PANSS-p3**		
Variables	**Effect**	**SE**	**T**	**LCI – UCI**	**Effect**	**Boot SE**	**Boot LCI - UCI**
CTQ	.03	.02	1.17	(-.0190 -.0725)			
DES-II					.03	.01	(.0102 -.0587)
CSA Total	.07	.04	1.66	(-.0147 -.1583)			
VISQ-other people					.21	.04	(.1267 -.2974)

Note: SE= Standard Error, *Boot=* bootstrap

6.5 Discussion

As expected, hallucinating patients scored significantly higher on the positive symptoms subscale of PANSS, but not on either the other subscales of the PANSS or PaDS-p, suggesting that the two groups were well matched. However, they scored higher for depression, dissociative experiences (both total scores and the two subscales of depersonalization and absorption), and the four subscales of the quality of inner speech questionnaire. They did not differ on the childhood trauma scales, except for sexual abuse, which was significantly higher for the hallucinating patients, which is similar to findings by Varese, et al. (2011).

We also found a strong relationship between hallucinations and dissociative experiences, as reported with English-speaking student populations (Alganami, Varese, Wagstaff, & Bentall, in press; Barkus, Stirling, & Cavill ,2010), cross-sectional patient studies in the UK (Varese et al., 2012) and Spain (Perona-Garcelán et al., 2012), and also in a UK-based experience-sampling study with patients, which showed that hallucinatory episodes are often preceded by dissociative states (Varese et al., 2011).

The finding that all of the quality of inner speech subscales were related to hallucination in the present study was in contrast with a study by de Sousa, Sellwood, Spray, Fernyhough, and Bentall (2016), which found that hallucinatory experiences were only associated with condensed and other people in inner speech in a clinical sample, and with the results of our Saudi students study (Chapter 5), which also found that only other people in inner speech was associated with hallucination-proneness. However, dialogic inner speech and other people in inner speech were the only inner speech variables which were associated with childhood sexual trauma.

The most important purpose of the current clinical study was to establish the association between hallucination and childhood trauma in Arabic patients of Saudi Arabia, which is a very different population from English-speaking countries. Our data revealed significant associations between these variables, which was consistent with data obtained elsewhere (e, g., Perona-Garcelán et al., 2012; Varese et al., 2012), implying that these associations are cross-culturally valid. The results of our study therefore add to existing research that has documented the occurrence of traumatic experiences in patients suffering from psychotic disorders (e.g., Read, Os, Morrison, & Ross, 2005; Read, Fink, Rudegeair, Felitti, & Whitfield, 2008) and is also consistent with previous studies that have shown that sexual abuse is particularly strongly related to hallucinations; indeed, in the present sample of 72 Saudi psychotic patients no less than 43% reported sexual abuse.

CSA was correlated with DES-II scores. More importantly, DES-II scores, together with the VISQ other people in inner speech variable, mediated the association between hallucinations and CSA. On the whole, these findings support recent accounts suggesting that the trauma-hallucinations link might be explained by dissociative experiences (Anketell et al., 2010; Moskowitz & Corstens, 2008; Varese et al., 2012). Given the strong associations between the dissociation measure and the two inner speech measures, it is possible that certain types of inner speech are characteristic of dissociative states. Consistent with this hypothesis, recent studies of inner speech in healthy individuals have shown that inner speech in the second person (addressing the self as "You"; which is likely to be a feature of both dialogic inner speech and other people in inner speech) tends to occur during emotionally challenging situations (Zell, Warriner, & Albarracin, 2012) and has the function of encouraging self-distancing and decreasing emotional arousal (Dolcos, & Albarracin, 2014).

A number of methodological limitations of the present study should be noted. First, the comparisons in our analyses were made only between two groups of psychotic patients and not including healthy controls. However, in our pervious study on Saudi students (Chapter 5) most of the scales used in this clinical study were applied on 131 healthy female university students with similar (although not identical) findings.

Second, the sample recruited was modest in size (72), which might limit the generalizability of the present study; the findings should therefore be interpreted with caution and should be repeated in larger patient samples. Third, the measure of hallucinations, PANSS, measured only current hallucinatory experiences and it is possible that some associations with hallucinations might have been found over a longer time period whereas others might not have been.

A further limitation is the fact that we measured childhood trauma using the CTQ, which is a retrospective self-report measure. However, a number of prospective studies of the relationship between childhood trauma and psychosis generally have produced similar results to those obtained from retrospective accounts (Varese et al., 2012). In addition, it has been shown that reports of child abuse amongst patients with psychosis are generally accurate and reliable, and have good concurrent validity with other information sources (Fisher et al., 2009). The other measures in this study were, of course, also self-report. Since the seminal paper by Nisbett and Wilson (1977) it has been well-recognised that people have particular difficulties when reporting the contents of their mental states. These difficulties might be especially true when people report on their own inner speech (Fernyhough, 2016), which may help to explain some of the between-study differences in the associations reported between types of inner speech and hallucinations.

The main clinical implication of our findings is that clinicians worldwide should consider childhood trauma when assessing psychotic patients, especially those who have experienced hallucinations. The findings add further support for current interest in the possibility that trauma-focused interventions might have some benefits in treating patients with psychosis (e.g., van den Berg & van der Gaag, 2012). However, in current Saudi mental health practice, trauma is rarely explored, and hence a specific implication of the current findings for local services is that clinicians must be educated to routinely inquire about trauma histories, and also consider the full range of psychological interventions that may be appropriate in these circumstances.

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Chapter 7

Discussion and conclusion

7.1 General Discussion

The five experimental studies included in this thesis address a number of important clinical and theoretical questions around the understanding of hallucinations within the contexts of source monitoring biases, and the roles of suggestibility, inner speech, trauma and dissociation.

In this Chapter I will attempt to deliver an integrative summary of the findings pertaining to the three main research themes enclosed in this doctoral dissertation (i.e. reality discrimination biases in hallucinations; the effect of suggestion on signal detection performances for both auditory and visual hallucinatory experiences, the association between trait suggestibility, dissociation and hallucinations when controlling for comorbidity and finally, the associations between childhood trauma, inner speech qualities, dissociation and hallucinations). The cross-culture validity of these relationships will be discussed, and these topics will be linked to other recent relevant research findings. In addition, and separately, the clinical implications and direction for future research, together with the studies' limitations and merits will also be covered.

7.2 Signal detection bias in hallucination and hallucination proneness: the effect of suggestion

First, the results from this thesis in general provide a further contribution to the source monitoring model of hallucinatory experiences. In Chapters 2, 3 and 4, the results indicated that highly hallucination prone students (identified using the LSHS-R) and hallucinating psychotic patients (identified using the PANSS) had lower response bias scores (β) on the signal detection task compared to student with low hallucination proneness and to non-hallucinating psychotic patients. In both studies, the healthy

participants and the non-hallucinating psychotic patients groups' performance differed on β, indicating that hallucination proneness was specifically associated with greater bias towards detecting the signals replicating other studies with both clinical non-clinical samples (Beck & Rector, 2003; Bentall, Baker, & Havers, 1991; Bentall & Slade, 1985; Choong, Hunter & Woodruff, 2007; Morrison, & Haddock, 1997; Rankin & O'Carroll, 1995; Varese, Barkus & Bentall, 2011, 2012; Vercammen, De Haan, & Aleman, 2008). These observations have been also supported by a recent meta-analysis (Brookwell, Bentall, & Varese, 2013).

However, in the students study (Chapter 3) and the patients study (Chapter 4), the signal detection results were dissimilar to those of previous studies in terms of perceptual sensitivity performance. That is, in both studies, we found that the two group (hallucination-prone vs non-prone students; hallucinating vs non-hallucinating patients) also scored differently on d', which is inconsistent with previous studies (e.g., Bentall, & Slade, 1985; Morrison, & Haddock, 1997; Varese et al., 2012; Vercammen et al., 2008). It is not clear why this was the case, which should be replicated in future related research. However, it might be argued that this inconsistency might be due to cultural variances in the case of our clinical study presented in Chapter 4, which included patients with schizophrenia spectrum recruited from Saudi Arabia who were culturally different from previous populations in which reality discrimination had been studied (mainly Europe or North America) although we had no expectation that these differences would affect sensitivity scores.

Only one study to date has reported findings that parallel the perceptual sensitivity findings reported here. A marginally significant effect of high hallucination-prone group on the item memory sensitivity ($d`$) score, reflecting a propensity to be slightly less accurate than low hallucination-prone group, was reported in a study by

Mckague, McAnally, Skovron, Bendall and Jackson (2012) but this study was an exception and employed a different paradigm.

It is unlikely that the *d'* results in the present studies are a methodological artefact, as the auditory SDT paradigm was identical to that used in previous studies, and as the finding was replicated in both auditory and visual modalities over several studies. One possibility is that this inconsistency with previous research is due to this being the first attempt to investigate reality discrimination ability in both visual and auditory modalities using SDT tasks, so it might be that the four runs undertaken by the students (as opposite to two runs in most previous studies) give the opportunity for them to better detecting of sensitivity differences. However, this explanation does not account for the results of the patient study in Chapter 4. Perceptual sensitivity should therefore be a focus for future research on the source monitoring judgments of people suffering from hallucinations and prone to hallucinations.

In the source monitoring model, hallucinations are conceptualised in terms of decision-making biases and deficits (Bentall, 1990; Bentall & Slade, 1985). Generally, the results of this thesis support this idea. The observation of SDT biases in non-clinical (e.g., Bentall & Slade, 1985; Rankin & O'Carroll, 1995; Varese et al., 2011) and clinical (e.g., Morrison & Haddock, 1997; Varese et al., 2012; Vercammen et al., 2008) studies suggested that abnormal reality discrimination embodies a continuing vulnerability which might precede the onset of psychotic disorders. Nevertheless, additional future research is required to further specify this cognitive bias. Additionally, and for wider interpretation, the findings of Chapter 4 suggest that, at least with regard to response bias, the reality discrimination approach to explaining hallucinations approved to be cross-culturally valid.

Second, we were interested to examine whether the deficits on reality discrimination in relation to hallucinations is modality non-specific. Current research in this domain has mostly tested source monitoring in auditory modality, and fewer studies have, looked for these abnormalities in other types of hallucinations such as, visual, olfactory or somatic. A modality specific impairment has been reported in source monitoring in schizophrenia patients with olfactory hallucinations and auditory hallucinations (Arguedas, Stevenson, & Langdon, 2012). In contrast, Feelgood and Rantzen (1994) tested university students, with high and low Launay-Slade Hallucination Scale scores and found that students with high LSHS scores reported more meaningful stimuli in both modalities.

For this purpose, we carried out an investigation of signal detection performance in the visual modality to examine if the source monitoring biases in hallucinations is modality non-specific; this study was presented in Chapter 3. The results indicated that the high and low hallucination prone students scored differently on β on both auditory and visual SDT tasks. However, interpreting the data was problematic, because the LSHS-R measures both visual and auditory hallucination-like experiences (in fact most items are non-specific). When we looked at the 3 most relevant LSHS-R items, the findings were not clear but there was some indication that at least the visual SDT performance was associated with the only specifically visual item on the scale. More studies are required to test whether source monitoring is modality specific, with better measures to tease out who has visual hallucinations and who has auditory hallucinations; these studies should include both healthy people and patients with psychosis.

Overall these findings suggest that both researchers and clinicians should give more attention to non-auditory hallucinatory experiences. These abnormalities should

be explored using experimental procedures which are equivalent to those used to examine auditory hallucinations. It is possible that studies of this kind might well shed light on the mechanisms accountable for the positive symptoms of psychosis in general. If hallucination proneness is associated with a modality non-specific deficits, this would help explain why many (but not all) patients who are experiencing auditory hallucinations also experience visual hallucinations and, furthermore, why those two types of hallucinatory experiences often occur at the same time (Oorschot et al., 2012).

Another aim of the thesis was to examine the effect of suggestion on the SDT performance; these effects were examined in Chapters 2 (testing healthy participants) and 4 (testing psychotic patients). The results of Chapter 2, Experiment 1 revealed that suggestions affected reality discrimination (SDT) performance in both high and low hallucination prone students equally. This did not fit with our expectation, as we had hypothesised that high hallucination prone individuals would be more suggestible than the low hallucination prone individuals. We therefore followed up this experiment with a second in which we provided the participants with a condition in which no suggestion was given and a condition with no voice suggestion (known as a negative suggestion). The results of Experiment 2 showed that the two groups of students with high and low hallucination proneness responded differently: in particular, high hallucination prone participants responded more to the high suggestion; i.e. the positive hallucination suggestion. In fact, there was no evidence that low hallucination prone students were influenced at all by the high suggestion.

This observation was also reported in Saudi psychotic patients with and without hallucinations, (Chapter 4). In the study, the results revealed again a robust effect of suggestions on SDT β scores, resulting in different responses between the two groups. Although both of the groups showed evidence of some effects from the suggestions,

these were greater in the hallucinating group and only this group showed a clear difference between the no voice suggestion condition and the high voice suggestion condition. It was therefore evident that hallucinating patients were especially responsive to the suggestion of a large number of voices being presented, which is in the same line with the results of Alganami, Varese, Wagstaff, and Bentall (2017) observed in Experiment 2 of Chapter. 2.

These results can be explained by arguing that individuals with high hallucination proneness are more likely to respond to suggestions that mostly and clearly endorse with their self-reported tendency to 'see and hear things that are not there'. This account would fit with research papers that have revealed an association between measures of hallucination proneness and suggestions that directly or indirectly enhance false positive responses (for example, Barkus, Stirling, & Cavill, 2010; Merckelbach & van de Ven, 2001; van de Ven & Merckelbach, 2003; Young, Bentall, Slade, & Dewey 1987). One previous study, by Haddock, Slade and Bentall (1995) also found a difference in a suggestion condition in which the participants were told that no stimuli would be present but, in this study did not observe source monitoring performance directly.

These findings are consistent with Bentall' (1990) theory that hallucinations are the product of decision-making errors about the sources of experience and that these judgments can be influenced by contextual factors that include the individual's beliefs about the likelihood of various kinds of events being 'real'. Given that suggestions, and beliefs in general, appear to play a role in source monitoring judgments it may be valuable in future research to explore how cultural belief systems affect these processes and influence hallucination symptoms.

7.3 The relationship between trait suggestibility, dissociation with hallucination and hallucination proneness when controlling for paranoia and/or depression

Previous research has consistently demonstrated an association between trait suggestibility, dissociation and hallucinations (Alganami et al., 2017; Barkus et al., 2011; Varese et al., 2011, 2012). In Chapter 2, in both experiments with healthy participants, we found a strong correlation between suggestibility as measured by IoS and dissociation as measured by DES-II and that both predicted hallucination proneness as measured by LSHS-R even after controlling for paranoia as measured by PaDSp. These findings are consistent, for example, with a study by Barkus et al. (2010). However, an important note of caution is that our correlational and regression analyses produced similar results when the questionnaire measures were used to predict paranoia, even when hallucinations was controlled for; there was an exception, in Experiment 2, where dissociation and not suggestibility was retained as a predictor of paranoia.

In Chapter 5 where we also tested healthy Saudi university students, and the findings revealed a strong correlation between suggestibility as measured by IoS and dissociation as measured by DES-II and that both related to hallucination proneness as measured by LSHS-R, these correlations survived controlling for paranoia as measured by PaDSp. Similar correlations were also found for associations between paranoia and IoS scores and DES-II scores, when controlling for LSHS-R scores. This pattern of results are similar to the UK students results presented in Chapter 2.

The strength of the association between dissociation and hallucination proneness found in our analogue studies (Chapters 2 and 5) was clarified by the findings of the correctional and regression analyses reported. Their effects however,

were not specific, and in this respect differed from other research with non-clinical (Escher, Romme, Buiks, Delespaul, & Van Os, 2002; Morrison & Petersen, 2003; Perona-Garcelan, et al., 2010; Varese et al., 2011) that have particularly implicated dissociation in hallucinatory experiences. Dissociation and suggestibility are multi-layered experiences, which are strongly associated in most cases (Eisen & Carlson, 1998), which rise the possibility of tap common or at least overlapping psychological processes. This fact has made it challenging to detect such specificities in our results of Chapters 2 and 5.

In the study presented in Chapter 4, testing psychotic Saudi patients, we obtained similar results; hallucinations scores as measured by PANSS-p3 was significantly and strongly associated with suggestibility as measured again by the IoS. This association remained significant when both paranoia PaDSp and depression BDI-II scores were controlled for. However, and differing from our studies with students (Chapters 2 and 5) there was not any association between suggestibility and paranoia either when controlling for hallucination and depression or not. Regarding the association between hallucinations scores as measured by PANSS-p3 and dissociation as measured by DES-II presented in the clinical stud, Chapter 6, their correlation was highly significant and survived controlling for paranoia PaDSp and depression BDI-II scores. The association between paranoia and dissociation was non-significant, and no association was found when hallucinations was controlled for.

The effects found in this clinical study was specific and consistent with previous studies with clinical samples (Perona-Garcelán et al., 2012; Varese et al., 2012). This psychopathological link therefore appears to be cross-culturally valid.

7.4 Childhood trauma, dissociation, inner speech qualities and their link to hallucination and hallucination proneness

The results of Chapter 5, with healthy Saudi students using the Arabic translated LSHS-R, PaDSp, DES-II, CTQ and VISQ questionnaires revealed that: first, childhood trauma was highly correlated with hallucination proneness, but less strongly with paranoia. Sexual abuse was only associated with hallucination proneness, and not with paranoia. The relationship between LSHS-R and both CTQ total scores and CSA survived controlling for paranoia, consistent with previous studies conducted in the English speaking countries with analogue samples (e.g., Morrison, & Petersen, 2003; Perona-Garcelán, et al., 2014; Varese et al., 2012). Second, we found that hallucination proneness was correlated with dissociation, which survived controlling for paranoia. Third, there were associations between hallucination proneness with VISQ inner dialogic, VISQ other people in inner speech, and VISQ motivational inner speech, but not with VISQ condensed speech. Only other people in inner speech and motivational inner speech survived controlling for paranoia. Finally, we found that the correlation between childhood trauma and hallucination proneness was partially mediated by dissociative experiences (e.g., Varese et al., 2012) and other people in inner speech. The role of dissociation and other people in inner speech were more robust for sexual abuse experiences.

The parallel results reported in Chapter 6 with psychotic Saudi patients, were very similar. Sexual abuse CSA was only associated with hallucinations, and not with paranoia, and no-other subscales of trauma were related to hallucinations, consistent with studies conducted in the English speaking nations with clinical samples (e.g., Perona-Garcelán et al., 2012; Varese et al., 2012). Second, hallucinations were associated with dissociation, DES-II depersonalization and DES-II absorption. Third,

hallucinations were also correlated with VISQ inner dialogic, VISQ inner condensed speech, VISQ other people in inner speech and VISQ motivational inner speech. All these associations survived controlling for paranoia and/or depression in all cases. Furthermore, consistent with the student study in Chapter 5, other people in inner speech mediated the relationship between sexual trauma and hallucinations; the effect for dissociation did not reach significance.

A number of previous studies (e.g., Kilcommons & Morrison, 2005; Perona-Garcelen, et al., 2008) have reported robust correlations between hallucinations and three types of dissociative experiences known as absorption, depersonalisation and derealisation. This could be an indicator of a particular association between hallucinations and detached dissociation (which includes derealisation and depersonalisation) but not compartmentalised dissociation (which includes amnesia) (for more details of these types see Holmes et al., 2005).

Taking the findings as a whole, first, childhood trauma and hallucinations appear to be strongly correlated and what is more is that sexual abuse has seems to be more than any other types of trauma specifically linked to hallucinations. Second, these findings support the hypothesis that the relationship between traumatic events and hallucinations can be explained by dissociative experiences (Anketell et al., 2010; Moskowitz & Corstens, 2008; Varese et al., 2012) and also are consistent with epidemiological and cross-sectional studies, which indicate a clear link between sexual abuse and hallucinations (Hammersley et al., 2003; Read & Argyle, 1999; Read, Agar, Argyle, & Aderhold., 2003; Read, Os, Morrison, & Ross, 2005; Shevlin, Dorahy, & Adamson, 2007; Varese, et al., 2012). These psychopathological links have proven to be cross-culturally valid.

7.5 Clinical implications

In terms of the clinical implications in general, the findings of this PhD thesis have added to the current literature that has examined the impact of suggestibility on the cognitive processes (reality discrimination) of psychotic patients, and to findings that have implicated childhood trauma, inner speech and dissociation in hallucinations. For treatment purposes, it might be promising to attempt to develop novel Cognitive Behavioural Therapy CBT interventions that directly target the way that patients' judgments about events are affected by their beliefs and expectations. It should be noted that this may not be easy to achieve because reality discrimination judgments are generally implicit (made without conscious deliberation). One possibility might be to try and demonstrate to patients how their beliefs affect their judgments, for example by conducting within-session mini-experiments on reality discrimination. Another possibility would be to try and develop direct reality training methods based more on associative processes (conditioning) rather than traditional CBT techniques.

As the strong association between hallucinations and childhood traumatic experiences has been validated in this thesis as in numbers of pervious research; the assessment of childhood trauma in psychotic individuals should be applied as a routine in all psychiatric services worldwide. Taking into considerations the specificity of the association between trauma types and psychotic symptoms, might provide the clinicians with some ideas about the psychological mechanism involved in these associations. For instance, childhood sexual abuse appears to be particularly significant in individuals with hallucinatory experiences and this information could be essential and helpful when clinicians deal with their hallucinating patients. Although particular mechanisms have been involved in specific psychotic symptoms, clinicians should take into account the way the psychological processes interact in their impact on the

symptoms of psychosis, especially since psychotic patients regularly report the experiencing of multiple symptoms. Exploring dissociation in patients with hallucinatory experiences will be of interest, as it appears that the dissociative experiences mediate the relationship between hallucinations and childhood trauma and sexual abuse.

Finally, the findings of this work give robust insights into the cognitive abnormalities that underlie hallucinatory experiences, and they also inform the need for developing culture-specific psychological intervention for patients with psychosis; with a recommendation that cognitive behavioural therapy for hallucinations should concentrate on the early traumatic events (especially sexual abuse), its link to dissociative experiences, and also concentrate on the sensory 'inner speech' qualities (especially other people in inner speech).

7.6 Limitations and strengths of the current studies

Although detailed coverage of the limitations of each of the current studies is presented in each relevant chapter, some of the general limitations will be mentioned here. First, the literature review (introduction to the thesis, Chapter 1) was narrative in form, and not systematic. The systematic review is a useful strategy, and begins with the systematic searching of online database and, unlike the present informal search of the literature, the formulation of specific research questions and hypotheses. It is argued that this approach decreases the potential for subjectivity and/or bias in the interpretation of findings of key studies (Bartolucci & Hillegass, 2010). Furthermore, an important advantage of the systematic review is that, if the chosen studies give consistent results, it provides evidence that a phenomenon is robust and transferable (Kitchenham, 2004). However, it should be noted that a systematic review and meta-

analysis of the source monitoring literature on hallucinations has recently been conducted (Brookwell et al., 2013) and that, although we worked to identify all relevant studies taking into account the usual constraints on time and resources, it seemed unnecessary to repeat this exercise. It should also be noted that the systematic review approach can be highly constraining, limiting the ability of investigators to imaginatively generate novel hypotheses.

Second, in studies presented in Chapters 2, 3 and 5 we recruited healthy participants (i.e., university students) who were selected using self-report questionnaires (e.g., LSHS-R). Nevertheless, the results obtained were to a large extent comparable to those obtained from clinical psychotic patients in the studies presented in Chapters 4 and 6.

Third, the auditory-visual signal detection study presented in Chapter 3, had a major weakness, which was using only the LSHS-R scale to select students with high and low hallucinations proneness. The problem is that most items of the scale are modality non-specific, and only one item asked about seeing things. This limitation could be resolved by replicating this study with both analogue and clinical studies and using other hallucinatory experiences scale that include parallel items of auditory and visual hallucinatory experiences (e.g., the Cardiff anomalous perceptions scale; CAPS, Bell, Halligan, & Ellis, 2006).

Fourth, most of the samples used in each study were relatively modest in size, and based on a convenience sample that allows the possibility of a bias in referral to the study and limiting the generalizability of the findings. Nonetheless, power calculations presented with each study, and comparisons with previous research, indicate that each of the studies was adequately powered to detect the effects of interest. Moreover, all

studies presented in this thesis employed cross-sectional designs, which made the inferences and the arguments about causality difficult. As our 5 studies existing in this thesis were not longitudinally designed, the causal order of events cannot be established, and other directions of causality cannot be ruled out. However, on the basis of previous research evidence, the studies in Chapters 5 and 6 on the associations between dissociation and hallucinations, for example, were supported by a study using the experience sampling method (Varese, Udachina, Myin-Germeys, Oorschot, & Bentall, 2011), which has shown that dissociative experiences precede the onset of hallucinations.

Finally, we measured childhood trauma using the CTQ, which is a retrospective self-report measure. However, a number of prospective studies of the association between childhood trauma and psychotic symptoms commonly have produced similar results to those obtained from retrospective accounts (Varese et al., 2012). Additionally, it has been revealed that reports of child abuse amongst patients with psychosis are mostly accurate and reliable, and have good concurrent validity with other information sources (Fisher et al., 2009). Since evidence consistently supports the strong relationship between childhood trauma and psychosis, it could be argued that controlling for post-traumatic stress disorder (PTSD) might be a necessity, as PTSD has been reported to be common experiences within the individuals with psychotic complaints (e.g., Resnick, Bond, & Mueser, 2003).

The strength, nonetheless, of the current thesis is that it focuses on both the mechanisms responsible for hallucinations, and also attempts to explore the cross-cultural validity of the relevant theoretical models.

7.7 Implications for future research

The study in Chapter 3 introduces the idea that the reality discriminations deficits in hallucinations might be modality non-specific, however, our results were ambiguous due to many reasons (discussed in limitations of both Chapter 3 discussion and above). There is, as a consequence, a need to further investigate the modality specificity question, using analogue and clinical data with better measures of both auditory and visual hallucinatory experiences.

As our results of Chapters 5 and 6 indicate that both dissociation and some qualities of inner speech appeared to mediate the association between hallucination and childhood trauma, especially sexual abuse, there is also a need to study the relationship between inner speech and dissociation variables; perhaps certain types of inner speech (particularly other people in inner speech) are characteristic of dissociative states.

In general, future research must focus on a more integrated psychobiological understanding of the link between trauma and psychotic symptoms. Examining the psychological and biological mechanisms together may provide a clearer understanding of this link. For example, Meewisse, Reitsma, De Vries, Gersons and Olff (2007) in their meta-analysis of the level of cortisol and post-traumatic stress disorder in adults and across 37 studies, 828 individuals with PTSD and 800 healthy individuals with no history of psychotic problems, the subgroup analyses revealed significantly lower levels of cortisol in people with PTSD than in healthy individuals not exposed to trauma, especially females exposed to sexual abuse. Given the finding that structural brain changes are more evident in psychotic patients with a history of childhood sexual abuse (Sheffield, Williams, Woodward and Heckers, 2013), it will obviously be important to consider the role of childhood trauma in the neuropsychological mechanisms associated with hallucinations.

Finally, the importance of cross-cultural studies of cognitive mechanisms in psychosis should be recognised. The role played by culture is important for both the treatment and management of patients with psychosis wherever they live. Although our results of the association between hallucinations, reality discriminations, trauma, dissociation and inner speech from Saudi Arabia were quite similar to the results obtained from the UK, staff in mental health services worldwide should be encouraged to deal with their patients from two major perspectives; first, the patients' cultural background, religion, social level and geographical residence, second, the patients' own views about their illnesses and treating their experiences as unique and different from others.

7.8 Final notes

In summary, the results, (discussed in the 5 studies), of the current thesis have helped to elucidate the mechanisms involved in hallucinations and explored their cross-cultural validity. In addition, the findings revealed in this thesis support the framework of a hallucination-childhood trauma (especially sexual abuse) link, which is mediated by dissociative experiences and certain inner speech characteristics. All of these associations appear to be cross-culturally valid.

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Appendix A

Ethical Approvals

From: IPHS Ethics
Sent: 04 December 2012 10:23
To: Bentall, Richard
Cc: Alganami, Fatimah
Subject: PSYC-1213-SG-30-The effect of suggestion on ³Auditory² signal detection performance in hallucination-prone subjects; (Suggestion and hallucination-proneness)

Dear Richard

I am pleased to inform you that IPHS Research Ethics Committee has approved your application for ethical approval. Details and conditions of the approval can be found below.

Ref: PSYC-1213-SG-30

PI / Supervisor: Richard Bentall

Title: The effect of suggestion on ³Auditory² signal detection performance in hallucination-prone subjects; (Suggestion and hallucination-proneness)

Date of Approval: 4th December 2012

The application was APPROVED subject to the following conditions:

Conditions

1 All serious adverse events must be reported to the Sub-Committee within 24 hours of their occurrence, via the Research Governance Officer (ethics@liv.ac.uk).

2 This approval applies for the duration of the research. If it is proposed to extend the duration of the study as specified in the application form, IPHS REC should be notified as follows. If it is proposed to make an amendment to the research, you should notify IPHS REC by following the Notice of Amendment procedure outlined at http://www.liv.ac.uk/researchethics/amendment%20procedure%209-08.doc.

3 If the named PI / Supervisor leaves the employment of the University during the course of this approval, the approval will lapse. Therefore please contact the Institute's Research Ethics Office at iphsrec@liverpool.ac.uk in order to notify them of a change in PI / Supervisor.

Best Wishes

John Downes

Chair, Ethics Committee

From: Downes, John
Sent: 17 April 2013 16:26
To: Bentall, Richard
Cc: IPHS Ethics; Alganami, Fatimah
Subject: Re: IPHS-1213-LB-074-The association between "Auditory" and "Visual" signal detection performances in hallucination-prone subjects

Dear Richard,

Thank you for dealing with the required amendments. I am happy to advise that full approval is now granted for this application.

Ref: IPHS-1213-LB-074-

PI / Supervisor: Richard Bentall

Title: The association between "Auditory" and "Visual" signal detection performances in hallucination-prone subjects

Date of Approval: 17th April 2012

The application was APPROVED subject to the following conditions:

Conditions

1 All serious adverse events must be reported to the Sub-Committee within 24 hours of their occurrence, via the Research Governance Officer (ethics@liv.ac.uk).

2 This approval applies for the duration of the research. If it is proposed to extend the duration of the study as specified in the application form, IPHS REC should be notified as follows. If it is proposed to make an amendment to the research, you should notify IPHS REC by following the Notice of Amendment procedure outlined at http://www.liv.ac.uk/researchethics/amendment%20procedure%209-08.doc.

3 If the named PI / Supervisor leaves the employment of the University during the course of this approval, the approval will lapse. Therefore please contact the Institute's Research Ethics Office at iphsrec@liverpool.ac.uk in order to notify them of a change in PI / Supervisor.

Best Wishes

John Downes

Chair, Ethics Committee

From: IPHS Ethics <iphsrec@liverpool.ac.uk>
Date: Thu, 12 Dec 2013 10:29:20 +0000
To: Richard Bentall <rpb@liverpool.ac.uk>
Subject: RE: IPHS-1314-LB-188-The effect of suggestions on Auditory Signal Detection performance in hallucination-prone subjects; and the association between musical ability and hallucination proneness

Dear Richard

I am pleased to inform you that IPHS Research Ethics Committee has approved your application for ethical approval. Details and conditions of the approval can be found below.

Ref: IPHS-1314-LB-188

PI / Supervisor: Richard Bentall

Title: The effect of suggestions on Auditory Signal Detection performance in hallucination-prone subjects; and the association between musical ability and hallucination proneness

Date of Approval: 12.12.13

The application was APPROVED subject to the following
conditions:

Conditions

1   All serious adverse events must be reported to the Sub-Committee within 24 hours of their occurrence, via the Research Governance Officer (ethics@liv.ac.uk).

2   This approval applies for the duration of the research. If it is proposed to extend the duration of the study as specified in the application form, IPHS REC should be notified as follows. If it is proposed to make an amendment to the research, you should notify IPHS REC by following the Notice of Amendment procedure outlined at http://www.liv.ac.uk/researchethics/amendment%20procedure%209-08.doc.

3   If the named PI / Supervisor leaves the employment of the University during the course of this approval, the approval will lapse. Therefore please contact the Institute's Research Ethics Office at iphsrec@liverpool.ac.uk in order to notify them of a change in PI / Supervisor.

Best Wishes

Liz Brignal

Secretary, IPHS Research Ethics Committee

Email: iphsrec@liv.ac.uk

http://www.liv.ac.uk/psychology-health-and-society/

From: Ethics
Sent: 08 August 2014 09:36
To: Alganami, Fatimah
Cc: Bentall, Richard
Subject: RE: RETH000736: Ethics review

Dear Professor Bentall and Ms Alganami,

I am pleased to inform you that the Sub-Committee has approved your application for ethical approval for your study. Details and conditions of the approval can be found below.

Ref: RETH000736

Sub-Committee: Non-Invasive Procedures

Review type: Full committee review

Principle Investigator: Professor Richard Bentall

Student Investigator: Ms Fatimah Alganami

School: School of Psychological Sciences

Title: The effect of suggestibility on source monitoring impairment in hallucinating patients; and the association between trauma, dissociation, inner speech and hallucinatory experiences

Date of initial review: 29/05/14

Date of Approval: 08/08/14

The application was APPROVED subject to the following conditions:

Conditions

All serious adverse events must be reported to the Sub-Committee within 24 hours of their occurrence, via the Research Integrity and Governance Officer (ethics@liv.ac.uk).

This approval applies for the duration of the research. If it is proposed to extend the duration of the study as specified in the application form, the Sub-Committee should be notified. If it is proposed to make an amendment to the research, you should notify the Sub-Committee by following the Notice of Amendment procedure outlined at http://www.liv.ac.uk/media/livacuk/researchethics/notice%20of%20amendment.doc. If the named PI / Supervisor leaves the employment of the University during the course of this approval, the approval will lapse. Therefore please contact the Research Integrity and Governance Officer at ethics@liverpool.ac.uk in order to notify them of a change in PI / Supervisor.

Kind regards

Matthew Billington

Research Integrity and Governance Officer; **Research Support Office**

University of Liverpool

Email: ethics@liverpool.ac.uk; **Telephone**: 0151 794 8290

Website: Research Integrity & Ethics

Kingdom of Saudi Arabia
Ministry of Health
Directorate of Health Affairs
(275/202)
Department of Medical Researches and Studies

Subject : Approval for conducting a research
HE; Director of Psychiatric Hospital
Greetings ,

This is to inform you that the below mentioned researcher will conduct a research as follows :

Researcher Name	FATIMAH HAMDI ALGANAMI
Researcher No.	00228
Approval no.	A00194
Research Title	The Effect of inspiration on the source monitoring and the relationship of dissociative experiences, childhood traumas, internal conversation and auditory hallucinations in a sample of patients with psychosis.
Approval period.	One year of its date .

After sight, and the research methodology was studied by the Scientific Committee and the Committee of Scientific Research Ethics registered at the National Committee of Bio and Medical Ethics with no .(H-02-J-002), no objection was found in respect to conducting this research .

Hoping to facilitate the researcher task to conduct the research ,taking into consideration the followings :

1- Follow the National Committee of Bio and Medical Laws.

2- The approval by the Department of Research should be obtained in case of research plan change.

3- No effect on service shall occur in the concerned facilities .

4- Maintain the rights of the people subject to research and their privacy.

5- Use of the information for scientific of researching purposes only .

6- A report of the study progress must be submitted to Department of Research every six months .

7- The research should be under supervision of Dr. Ebtehag Falatah.

Your cooperation is highly appreciated.

Best regards ,

Assistant Director of Health Affairs of Planning & Development- Jeddah

Dr. Osama Obaid Zufar

Signed

227

Appendix B

Arabic PANSS

مقياس: (المقابلة شبه المقننة الأعراض الذهانية الإيجابية والسلبية PANSS)

ع1: الهموم الجسدية (الشكاوى الجسمية / الاعتقادات حول المرض أو التعطل الوظيفي)

1 كيف كانت صحتك الجسمية خلال الاسبوع الماضي؟.................

2 هل سبق أن قلقت بأن هناك شيء غير صحيح في جسمك؟.................

3 هل تعاني من مرض عضوي (جسمي)؟.................

4 هل قد شعرت بأن جسمك أو رأسك يبدوان غريبين؟.................

5 أو هل حصلت لك مشكلة في الطريقة التي يعمل بها جسدك؟.................

6 هل تغير رأسك أو جسمك من ناحية الشكل أو الحجم؟.................

إذا أجاب **بنعم** على أي من الأسئلة السابقة:

7 إلى أي مدى مشكلتك الصحية خطيرة؟.................

8 ما الذي سبب لك هذه المشكلة؟.................

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	مهموم بشكل واضح حول الصحة والمسائل الجسدية، لديه أسئلة عرضية ملحوظة مع الرغبة في الاطمئنان
4	متوسط	شكاوى حول ضعف الصحة/ وسوء الأداء الوظيفي للجسد، ولكن بدون ضلالات والهموم المبالغ فيها يمكن تهدئتها وتخفيفها
5	أشد من متوسط	يعبر عن العديد من الشكاوى المتكررة حول التعطل الوظيفي الجسدي والعضوي، أو يظهر واحد أو أثنين من الضلالات الواضحة في هذه المسائل، ولكن ليس مشغول بها أو مستغرق فيها
6	شديد	مستغرق ومشغول بواحد أو قليل من الضلالات الواضحة حول التعطل الوظيفي الجسدي والعضوي، ولكن المشاعر ليست مغمورة تماماً بهذه المسائل، والأفكار ممكن أن تتحول بواسطة الأخصائي (صاحب المقابلة) مع بعض الجهد
7	غاية في الشدة	تكرار العديد من الضلالات الجسدية، أو قليل منها ذات طبيعة مرعبة وخطيرة ومهددة والتي تسيطر على المشاعر والتفكير

ع2: القلق(المرور بخبرات عصبية، قلق/ خوف أو عدم الراحة)

1 هل تجد نفسك تقلق حول الأشياء كثيراً؟.................

2 هل شعرت بالعصبية/التوتر/الخوف خلال الأسبوع الماضي؟.................

3 كيف تشعر بالقلق، على مقياس مدرج من 1 إلى 10 ، حيث 10 تعني أشد حالة قلق قد تشعر بها؟.................

إذا أجاب **بنعم** على أي من الأسئلة السابقة:

4 هل أنت خائف من شيء أو شخص؟.................

5 هل قد وقعت في حالة ذعر/أو شعرت برجفة/ضعف/أو متعرق كنتيجة لشعورك بالقلق؟.................

تعريف الذعر: الشعور بالخوف الشديد والقلق والذي يأتي عادةً بسرعة وعلى حين فجأة ويستمر لوقت قصير. خلال هذه الهجمة يكون لدى الأفراد أحاسيس جسدية غير سارة مثل: سرعة نبضات القلب، سرعة التنفس أو ضيق في النفس، ألم بالصدر، الشعور بالوهن والدوخان، الارتعاش/الرجفة أو التعرق.

6 هل قلقك وعصبيتك أثرت على شهيتك/نومك/قدرة على العمل خلال الأسبوع الماضي؟.................

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	بعض القلق، هم مبالغ فيه أو عدم الراحة الشخصية/الذاتية، ولكن بدون نتائج جسدية أو سلوكية مخبره أو مستدل عليها

4	متوسط	يظهر أعراض واضحة من العصبية، منعكسة على تعطل وظيفي خفيف (مثل: رعشة يد خفيفة أو تعرق الجسم)
5	أشد من متوسط	مشكلة قلق خطيرة والتي لها نتائج جسدية وسلوكية (مثل: التوتر الملحوظ، ضعف الانتباه، الخفقان والنوم المعطل)
6	شديد	بصفة دائمة خوف مستمر مع حالة فوبيا، عدم الارتياح الملحوظ أو العديد من التعطل الجسدي الوظيفي
7	غاية في الشدة	الحياة متدهورة بشدة ومتعطلة بهذا القلق والذي يظهر بصفة مستمرة وفي بعض الاوقات يصل لنسبة من الذعر أو يدخل في هجمات ذعر

ع3: مشاعر الذنب (لوم الذات لأجل آثام/شرور حقيقية أو خيالية حدثت في الماضي)

1 هل تتجه للوم ذاتك على الأشياء التي قد حدثت؟.............................

2 هل تشعر بالذنب حيال شيء فعلته في الماضي؟.............................

3 هل حصل وشعرت بأنك تستحق العقاب على شيء فعلته من قبل؟.............................

إذا أجاب **بنعم** على أي من الأسئلة السابقة:

4 ما نوع العقاب الذي تستحقه؟.............................

5 ما الذي تستحق العقاب عليه؟.............................

6 هل قد فكرت في إيذاء نفسك كنوع من العقاب؟ .... وهل تصرفت بناء على الأفكار؟.............................

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	الاستجواب يفصح عن شعور غامض بالذنب/لوم الذات لأجل حادث صغير وبشكل واضح ولكن لا يبدو مهموم بذلك
4	متوسط	يعبر عن هم واضح ومبالغ حول مسؤوليته عن حادث حقيقي ولكن ليس مشغول به او منهمك فيه، والاتجاه والسلوك ليس بالضرورة متأثر بذلك
5	أشد من متوسط	يعبر عن شعور قوي بالذنب مرافق للشعور بانتقاص الذات أو الاعتقاد بأنه يستحق العقاب. شعور الذنب ربما يحمل محتوى ضلالي وقد يظهر بطريقة عفوية، وقد يكون مصدر للاستغراق أو المزاج الإكتئابي، ولا يمكن تخفيفه أو تسكينه بواسطة الأخصائي (صاحب المقابلة)
6	شديد	أفكار قوية ذات نوعية ضلالية تقود إلى الشعور باليأس وعدم القيمة والتصرف بناءً على ذلك والاعتقاد بأنه يستحق عقوبة شديدة أو مؤلمة لأجل الآثام والشرور التي قام بها، وربما يعتبر وضعه المرضي الحالي هو عقاب على ذلك
7	غاية في الشدة	ضلالات غير متزعزعه بالذنب تسيطر على حياته والتي بناء عليها أستحق العقاب القاسي/العنيف (مثل: الحبس، التعذيب أو الموت) وهذه الضلالات ربما تكون مُرافقة بأفكار انتحارية، أو بعزو مشاكل الآخرين للآثام التي أقترفها في الماضي

ع6: الاكتئاب (الشعور بالحزن، الوهن/التثبيط، العجز و التشاؤم)

1 ماهو المزاج المعتاد الذي كنت عليه الأسبوع الماضي؟.............................

2 هل أنت عموماً سعيد أو حزين؟.............................

3 هل مررت بفترات من الشعور بالحزن/العجز خلال الأسبوع الماضي؟.............................

إذا أجاب **بنعم** على أي من الأسئلة السابقة:

4 إلى أي درجة تشعر بالحزن/عدم السعادة، على مقياس مدرج من 1 إلى 10 ، حيث 10 تعني أشد حالة حزن قد تشعر بها؟.............................

5 عندما تشعر بالحزن الشديد؛ كم تستمر معك هذه المشاعر؟.............................

6 هل تبكي أحياناً؟ .... كم مرة بالعادة؟.............................

7 هل يؤثر مزاجك السيء على شهيتك/نومك/قدرتك على العمل؟.............................

8 هل انخفضت أو انعدمت اهتماماتك بالأنشطة والهوايات أو الأشياء التي أعتدت عليها وكانت تمتعك في الماضي؟.............................

230

9 هل لديك أفكار لإيذاء نفسك؟...

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار /مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	يعبر عن بعض الحزن والوهن عندما يُسأل فقط، ولكن لا يوجد هناك دليل على الاكتئاب سواء على الاتجاه أو التصرفات
4	متوسط	مشاعر واضحة بالحزن/العجز والذي قد يظهر بعفوية، ولكن المزاج المكتئب يؤثر على السلوك والأداء الاجتماعي بصورة ضئيلة/ضعيفة. من الممكن إسعاده
5	أشد من متوسط	مزاج مكتئب واضح مترافق مع حزن ظاهر، تشاؤم، فقدان الاهتمام الاجتماعي، تدهور حركي/نفسي و الذي يتداخل في بعض الأوقات ويضر الشهية والنوم. لا يمكن بسهوله إسعاده
6	شديد	مزاج مكتئب بشكل ملحوظ، بؤس، عجز، عدم القيمة وبكاء عرضي. تداخل رئيسي يضر بالشهية والنوم وكذلك بالحركة الاعتيادية والوظائف الاجتماعية
7	غاية في الشدة	مشاعر إكتئابية حادة تتداخل وتضر في معظم الوظائف. بكاء متكرر، أعراض جسدية معلنه، تركيز معطل ، تدهور حركي/نفسي، تجاهل الذات، عدم اهتمام اجتماعي، واحتمالية أوهام غير موجودة وضلالات إكتئابية. احتمالية أفكار أو أفعال انتحارية

ع12: إنعدام الحكم والبصيرة (تعطل الوعي/عدم فهم حالته الذهانية ومواقف الحياة. إنكار الحاجة للعلاج، عدم القدرة على التعرف على الأعراض الذهانية، غير واقعية التخطيط قصير وطويل المدى)

1 هل تشعر عموماً بأنك في حاجة للمساعدة والعلاج من المختصين والأطباء في الخدمة النفسية؟.....................

2 هل تشعر بأنك تعاني من مرض نفسي أو بأنك قد عانيت من واحد في الماضي؟.....................................

إذا أجاب بـ**نعم** على أي من الأسئلة السابقة:

3 ماهو؟...

4 ما مدى جدية هذا المرض على مدرج من 1 إلى 10؟...

5 أين ترى نفسك/ وما الذي تتمنى القيام به وإنجازه خلال سنة؟............................. خمس سنوات؟.....................

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار /مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	يتعرف على مرضه النفسي ولكن غير مقدّر درجة خطورته، ولا عواقب ونتائج العلاج أو أهمية أتخاذ اجراءات لمنع التعثر. تصور وتوقع ضعيف بخصوص التخطيط المستقبلي
4	متوسط	ادراك ضحل وغير واضح لمرضه النفسي. تذبذب في إقراره بكونه مريض أو وعي قليل بالأعراض الرئيسية المتواجدة مثل: الضلالات، اضطراب التفكير، الشكوك والانسحاب الاجتماعي. قد يمنطق حاجته للعلاج من اجل تهوين الأعراض مثل: القلق وسوء النوم وأخرى
5	أشد من متوسط	يقّر بالمرض في السابق وليس الآن. إذا تم جداله يقرّ بوجود بعض الأعراض غير المتصلة أو غير المهمة والتي يشرحها بعيداً عن طريق التفسير الخاطئ الإجمالي أو التفكير الهذائي/الضلالي. الحاجة للعلاج غير معترف بها
6	شديد	ينكر تماماً بأنه مريض نفسي. وينكر أي وجود للأعراض الذهانية في الماضي أو الوقت الحاضر، وكذلك يشتكي وينكر حاجته للعلاج أو البقاء في المستشفى
7	غاية في الشدة	أنكار ملفت للنظر للمرض سواء في الماضي أو الحاضر مع إعطاء تفسير هذائي/ضلالي للوجود في المستشفى أو أخذه للعلاج مثل: كعقاب للآثام التي أقترفها أو كاضطهاد من قبل المعذبين/الجلادين

إ1: الضلالات/الهذاءات (الاعتقادات التي ليس لها أساس من الصحة، غير الواقعية والغريبة/العجيبة)

ضلالات مرجعية (قناعة وهمية بأن الأحداث العادية، الأشياء أو سلوكيات بعض الآخرين تشير إلى معاني غير عادية وتعود للشخص ذاته)

1 هل تشعر في بعض الأوقات بأن الآخرين يُرجعون إليك أو يقولون عنك أشياء تحمل معنيّين؟.....................

2 هل ترى رسائل شخصية لك في الجرائد أو على شاشة التليفزيون؟...

231

3 هل تشعر في بعض المناسبات بأن بعض الأحداث والحوادث تحمل معنى خاص لك أنت بالتحديد؟.....................................

<u>التفسير الضلالي الخاطئ</u>

4 هل ترى في بعض المناسبات رسالة سرية في الطريقة التي تنظم بها الأشياء من حيث وضع ملصقاتها أو لونها أو في الطريقة التي تحدث بها الأشياء؟.....................................

5 أو في اقتباس الأفكار؟.....................................

6 هل تجد أحياناً بأن الأشياء التي فكرت فيها أو ناقشتها مسبقاً مقتبسة في الجرائد أو على شاشة التليفزيون؟.....................................

<u>إنتحال شخصية المعروفين/المشهورين</u>

7 هل تشعر بأن مظهر شخص تعرفه جيداً تغيّر بطريقة ما ليصبح يشبهك/ينتحل شخصيتك؟.....................................

<u>ضلالات الإضطهاد</u>

8 هل يبدو لك بأن هناك شخص يحاول إيذائك؟.....................................

إذا أجاب <u>بنعم</u>

9 هل يحاول الاستفراد بك؟.....................................

10 كيف جربت/مررت بذلك؟.....................................

11 هل من الممكن أن يكون وراء ذلك مؤامرة أو محاولة أيذاء؟.....................................

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	1 أو 2 من الضلالات الغامضة وغير المتبلورة وليس متشبث بها بقوة. الضلالات لا تتداخل وتعطل التفكير، العلاقات الاجتماعية أو السلوك
4	متوسط	وجود مجموعة متنوعة من الضلالات ضعيفة التشكيل وغير ثابته أو قليل منها متشّكلة جيداً والتي تتداخل قليلاً وتعطل التفكير، العلاقات الاجتماعية أو السلوك
5	أشد من متوسط	العديد من الضلالات جيدة التشكيل والمتشبّث بها والتي عادةً ما تتداخل وتعطل التفكير، العلاقات الاجتماعية أو السلوك
6	شديد	مجموعة مستقرة وثابتة من الضلالات المتبلورة والمنظمة والتي تتداخل بوضوح وتعطل التفكير، العلاقات الاجتماعية أو السلوك
7	غاية في الشدة	كثير جداً من الضلالات الثابتة والمستقرة والمنظمة بقوة والتي تسيطر على معظم جوانب الحياة والتي بالعادة ينتج عنها ردود فعل غير مناسبة وغير مسئولة والتي قد تضرّ بسلامة الشخص نفسه والمحيطين به

<u>5: جنون العظمة (الرأي الذاتي المبالغ فيه والقناعات/الاعتقادات بالأفضلية/التفوق، تتضمن ضلالات بقدرات غير عادية/خارقة، الثروة، المعرفة/العلم، السمعة، السلطة والاستقامة/الصلاح الأخلاقي)</u>

1 كيف تشعر بنفسك بالمقارنة مع الشخص العادي؟.....................................

2 هل لديك موهبة/قدرات/خاصية أو سلطة/قوة غير عادية والتي بالعادة لا يملكها الأشخاص الآخرين؟.....................................

2.1 مثلا: هل قد شعرت مطلقاً بأنك تستطيع قراءة عقول/أفكار الأخرين؟.....................................

3 هل ترى نفسك ذو ثروة؟ شهرة؟ هل قد ظهرت على شاشة التليفزيون أو على الراديو أو في السينما أو على خشبة المسرح؟.....................................

4 هل تعد نفسك عالي/ذو شأن على مقياس المعايير الأخلاقية؟.....................................

4.1 هل يجعلك هذا الشي خاص في بعض الجوانب؟.....................................

5 هل تحمل رسالة خاصة في هذه الحياة؟..

5.1 كيف حصل هذا؟...

6 هل أنت رجل متديّن؟..

6.1 ماهي علاقة بالله؟..

6.2 هل أنت قريب إلى الله أكثر من الأشخاص الآخرين؟...

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	بعض سمات العظمة والتباهي يمكن الاستدلال عليها، ولكن بدون ظهور واضح لهذاء العظمة
4	متوسط	شعور ظاهر وغير واقعي بالأفضلية/التفوق على الآخرين. بعض من الضلالات ضعيفة التشكيل وحضور الشعور بالمركز/القدرات الخاصة ولكن لا يتصرف بناءً عليها
5	أشد من متوسط	ضلالات ظاهرة بوضوح بوجود مركز/سلطة/قدرات خارقة والتي تؤثر على الاتجاه ولكن ليس على السلوك
6	شديد	ضلالات ظاهرة بوضوح بوجود أفضلية/تفوق خاص والمعبر عنها في (الثروة، السمعة، المعرفة/العلم) والتي تزاد بمقدار أكثر من واحد، وتؤثر على التفاعلات بشكل ملحوظ ويتصرف بناءً عليها
7	غاية في الشدة	التفكير، التفاعل والسلوك مسيطر عليها تماماً بعدة ضلالات مجتمعة بوجود قدرات/ثروة/معرفة/سمعة/منزلة أخلاقية رائعة والتي من الممكن أن تأخذ نوعية شاذة/غريبة

إ6: الريبة/الشكوك والاضطهاد (أفكار غير واقعية/مبالغ فيها بالاضطهاد ظاهرة وتنعكس على الاحتراس، الظنون/توجه الارتياب، الشكوك، الحذر/اليقظة، أو ضلالات بأن الآخرين يريدون إيذائه)

1 كيف تشعر بعلاقتك مع الآخرين؟..

2 هل تحب/ترتاح للأشخاص الآخرين؟............. لا تحب/لا ترتاح لهم؟..................................

إذا أجاب لا يحبهم/لا يرتاح لهم

2.1 هل تنزعج من الأشخاص الآخرين على وجه الخصوص؟...

2.2 تخاف منهم؟............. لماذا؟..

3 هل تشعر بأن معظم الأشخاص الآخرين يحبونك؟.................... لا يحبونك؟................. ولماذا؟.........

4 هل تثق بمعظم الأشخاص الذين تعرفهم؟..

4.1 هل هناك البعض الذي لا تثق به؟................. من؟..... ولماذا؟................................

5 هل قد شعرت بأن البعض قد تكلموا عنك في ظهرك/غيابك؟..

5.1 ما الذي تعتقد أنهم قالوه؟.................... ولماذا؟..

6 هل قد شعرت بأن البعض يتجسس عليك/يتآمر ضدك/يحاول إيذائك/قتلك؟.............................

6.1 ماهو دليلك على ذلك؟..

6.2 من بإعتقادك وراء كل ذلك؟...

6.3 لماذا يحدث لك هذا ؟..

233

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	يعرض توجّه/اتجاه متسم بالحذر وعدم الثقة على نحو متسع، ولكن الأفكار/التفاعلات/السلوك تأثرها ضعيف ومحدود
4	متوسط	عدم الثقة واضح وملحوظ والذي يتطفل ويدخل عنوة على المقابلة و/أو السلوك، ولكن ليس هناك دليل على ضلالات الاضطهاد، وربما يكون هناك مؤشر على بعض ضلالات الإضطهاد الفضفاضة والتي لا تبدو مؤثرة على الاتجاه والعلاقات الشخصية
5	أشد من متوسط	يظهر عدم ثقة ملحوظ جداً، يقود إلى تشويه رئيسي وكبير على العلاقات الشخصية. أو ضلالات اضطهاد جليّة وواضحة والتي يكون لها تأثير محدود على العلاقات الشخصية والسلوك
6	شديد	ضلالات اضطهاد منتشرة وملحوظة جداً والتي قد تكون منظمة وتتداخل بقوة وتعطل العلاقات الشخصية
7	غاية في الشدة	شبكة متكاملة من ضلالات الإضطهاد المنظمة والمسيطرة على التفكير، التفاعل الاجتماعي والسلوك

إ7: الغضب العارم/الشديد (التعبير اللفظي وغير اللفظي عن الغضب والاستياء/الضغينة تتضمن السخرية/التهكم، السلوك/ ردود الفعل السلبية والعدوانية، الإساءة/الاستغلال اللفظي والهجومية)

1 كيف أنت في علاقاتك مع الناس مؤخراً؟........... مثلاً: عائلتك، أصدقائك أو زملاء العمل؟.............

2 هل أنت منزعج أو مستاء/غاضب؟..............

إذا أجاب **بنعم**

3 هل قاد ذلك إلى جدال مع الأخرين حتى على المسائل البسيطة، والتي بالعادة لا تزعجك؟.............

3.1 هل كنت منزعج جداً لدرجة تجعلك تصرخ على الآخرين أو تبدأ جدال/مضاربة؟.............

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	تواصل وتعبير غير مباشر ومقيد ومعبر عن الغضب (مثل: سخرية، عدم احترام، تعبير غاضب أو انزعاج عرضي)
4	متوسط	يعرض أتجاه مكشوف بالغضب والذي يظهر انزعاج متكرر وتعبير مباشر عن الغضب أو الضغينة
5	أشد من متوسط	منزعج بصورة عالية وواضحة مع الإساءة اللفظية عادة أو التهديد
6	شديد	عدم تعاون وإساءة لفظية أو تهديد ملحوظ يؤثر على المقابلة وبجدية يؤثر على التفاعل الاجتماعي. ممكن يكون عدواني ومشوش ولكن يوجه اعتداء/هجوم جسدي للآخرين
7	غاية في الشدة	غضب ملحوظ ينتج عنه عدم تعاون واضح/شديد يعيق التفاعلات الأخرى، أو ينتج عنه حلقات/سلسلة من الاعتداء الجسدي تجاه الأخرين

إ3: السلوك الهلوسي/الهلاوس (تقرير لفظي أو سلوك يعطى إدراك غير ناتج عن مثيرات خارجية. قد تكون هذه الهلاوس سمعية، بصرية، شمية أو جسدية/عضوية)

1 هل قد سبق واختبرت/مررت بتجارب أو خبرات غريبة؟ سمعت إزعاجات/أصوات غريبة أو أحياناً تسمع أشياء لا يسمعها الأخرين؟.............

2 هل تستقبل أحياناً اتصالات شخصية من الراديو أو التليفزيون؟..............

3 هل تستطيع في بعض الأحيان سماع الأصوات العالية التي داخل رأسك؟..............

إذا أجاب **بنعم**

3.1 كم عددها؟..............

3.2 هل يتحدثون إليك، يعلقون عليك أو على تصرفاتك، أو يتحدثون لبعضهم البعض؟..............

3.3 ماذا تقول تلك الأصوات؟..............

3.4 هل هم طيبون أو سيئون؟..............

3.5 هل تخاف منهم؟...

3.6 هل يخبرونك بما تفعل؟ يعطونك أوامر مباشرة؟...

3.7 هل تطيع أوامر/تعليقات تلك الأصوات؟.................................. هل يجب عليك ذلك؟...........................

4 هل حدث وظهرت لك الأشياء العادية غريبة الشكل أو مشوهه أو هل لديك بصيرة أو ترى أشياء لا يراها الأخرين؟..............

إذا أجاب **بنعم**

4.1 كم مرة بالعادة؟..

4.1 ما درجة وضوح تلك الصور/الأصوات؟..

4.3 هل الرؤية/الصور تحدث/تظهر مع الأصوات أو منفصلة؟..

5 هل حدث وشممت أشياء لا يشمها الأخرين؟...

6 هل حدث لك أو جرّبت أحاسيس غريبة على جسدك أو شعرت بأن هناك شيء غريب داخل جسدك؟..........................

إذا أجاب **بنعم على الأصوات أو الرؤية/الصور**

1 من ماذا تكونت هذه الأصوات أو الرؤية/الصور؟...

2 كيف ظهروا أو حدثوا لك؟..

3 هل هم مشكلة بالنسبة لك؟...

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	1 أو 2 هلاوس متشكلة وواضحة ولكن ليست متكررة، أو عدد غامض من الإدراكات الحسية غير العادية والتي لا ينتج عنها تشويه في التفكير أو السلوك
4	متوسط	الهلاوس تظهر بصورة متكررة ولكن ليست متواصلة، والتفكير والسلوك متأثر فقط لدرجة بسيطة وليست كبيرة
5	أشد من متوسط	الهلاوس متكررة ومن الممكن أن تنطوي على/تحتوي أكثر من حاسة واحدة وتنحو إلى تشويه التفكير و/أو تعيق السلوك. وقد تأخذ تفسير ضلالي لتلك الخبرات الهلوسية وتتم الاستجابة لهم إنفعالياً/عاطفياً، وفي بعض المناسبات لفظياً أيضاً
6	شديد	الهلاوس تظهر متواصلة في معظم الأوقات وتسبب تعطل وتشويش رئيسي على التفكير والسلوك. تعامل هذه الهلاوس على أنها مدركات حسية واقعية/حقيقية، والأداء معطل/معاق بسبب الاستجابة الانفعالية واللفظية لهم
7	غاية في الشدة	تماماً منشغل/مسيطر عليه بصورة دائمة بهذه الهلاوس، والتي تسيطر فعلياً على التفكير والسلوك. وتزود هذه الهلاوس بتفسيرات ضلالية وتثير/تحفز الاستجابات اللفظية والسلوكية، متضمنه طاعة/تنفيذ لأوامر تلك الهلاوس

ع13: اضطراب الإدارة (اضطراب في الاستهلال/المبادءة، في المعيشة والتحكم بالأفكار الذاتية، السلوك، الحركة والكلام/الحديث)

1 هل تجد من الصعب أن تأخذ قرار في حياتك اليومية؟...

إذا أجاب **بنعم**

1.1 هل حدث ذلك خلال الأسبوع الماضي؟..

2 أعطني مثالاً؟..

3 هل تجد في بعض الأوقات أن سلوكك بلا هدف أو متفكك/غير مترابط؟ ولذلك حياتك الروتينية اليومية فوضوية/مشوشه بسبب كونك غير قادر على أن تخطط تصرفاتك بصورة صحيحة؟

إذا أجاب **بنعم؛** أستكشف/أستوضح أكثر لماذا؟ مع أمثلة؟...

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	بعض الأدلة على التردد في المحادثة والتفكير والذي ربما يعيق العمليات اللغوية والمعرفية/العقلية لدرجة بسيطة
4	متوسط	بالعادة متردد ويظهر صعوبة واضحة في الوصول إلى قرار. المحادثة قد تشوه/تعطل بتبديل تسلسل التفكير، أدائه اللفظي والمعرفي معطل/ضعيف بوضوح
5	أشد من متوسط	اضطراب الإرادة يتداخل ويعطل السلوك والتفكير. تردد واضح والذي يعيق استهلال/مبادءة ومواصلة النشاطات الحركية والاجتماعية والذي يمكن ملاحظته في التعثر/التلعثم في الحديث/الكلام
6	شديد	تنفيذ/إجراء أو أداء الوظائف الحركية الاتوماتيكية (مثل: اللبس، والتبرج/وضع المكياج) متعطل/مشوش والحديث/الكلام أيضاً متأثر بشكل ملحوظ
7	غاية في الشدة	بصفة دائمة فشل/سقوط كامل في الإرادة ملاحظ بواسطة الكف/التثبيط الشديد عن الحركة والكلام وينتج عنه الجمود/عدم الحراك و/أو التوحدية/الإنزال

س4: السلبية/اللامبالاة، الانسحاب الاجتماعي (تلاشي الاهتمام والمبادءة في التفاعلات الاجتماعية بسبب الانعزالية/التوحد، عدم الاكتراث، وتلاشي الطاقة والإرادة تقود إلى تناقص/نقص التعاطي/الاندماج الشخصي وتجاهل نشاطات الحياة اليومية)

1 هل تفضل أن تبقى وحيداً؟...

2 كيف تقضي وقتك هذه الأيام؟...

3 هل تنضم إلى نشاطات مع الأفراد الأخرين؟...

إذا أجاب **بـلا**: لماذا؟...

إذا أجاب **بنعم**

4 هل لديك العديد من الأصدقاء؟...

5 القليل فقط أو لا أحد؟.....................   6   لماذا؟...

7 ماذا عن الأصدقاء المقربين؟...

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	يعرض اهتمام عرضي/وقتي للأنشطة الاجتماعية ولكن مع ضعف/سوء مبادئه. عادةً يختلط مع الأخرين فقط عندما يتواصلون هم معه
4	متوسط	يتصرف/يتوجه بسلبية مع معظم الأنشطة الاجتماعية ولكن بطريقة أتوماتيكية/جامدة أو غير مهتم. يتجه للانسحاب إلى الخلفية
5	أشد من متوسط	يشارك/يساهم بسلبية في القليل فقط من الأنشطة ويظهر عدم اهتمام فعلياً في المبادءة. يقضي وقت قليل مع الأخرين عموماً
6	شديد	يبدو لا مبالي ومنعزل، يشارك نادراً في الأنشطة الاجتماعية ويتجاهل احتياجاته الشخصية عرضياً. لديه القليل من التواصل الاجتماعي العفوي/التلقائي
7	غاية في الشدة	لا مبالي بعمق/بشدة، منعزل اجتماعياً وشخصياً مهمل/متجاهل

ع16: التجاهل/التجنب الاجتماعي النشط/العملي (تضاؤل/ضعف المشاركة/الانخراط الاجتماعي المرتبط بالخوف غير المبرر، الغضب أو عدم الثقة)

1 * هل تحب المشاركة في الأنشطة الاجتماعية بوجه عام؟...

2 * هل تشعر بأنه يتم دفعك للمشاركة في هذه الانشطة؟...

3 * هل تحب التواجد في الأماكن العامة كالأسوق مثلاً؟...

4 * هل تشعر بالضيق في وجود الأخرين حولك؟.....................   ولماذا؟...

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	يبدو معتل بسهولة في حضور الآخرين ويفضل قضاء الوقت لوحده، ومع ذلك يشارك في الأنشطة إذا طلب منه ذلك
4	متوسط	يمتلكه شعور الحسد عندما يحضر/يشارك في بعض أو كل الانشطة الاجتماعية، يحتاج إلى الحث/الاقناع ليواصل المشاركة أو سيقطعها أو ينهيها على حساب القلق، الشك أو الغضب
5	أشد من متوسط	بسبب الخوف أو الغضب يحاول البقاء بعيداً عن العديد من التفاعلات الاجتماعية، بغض النظر عن محاولة الآخرين لجعله ينخرط معهم. ينحو لقضاء معظم وقته غير المرتب/المنظم لوحده
6	شديد	يساهم في عدد قليل جداً من الأنشطة الاجتماعية بسبب الخوف، الغضب أو عدم الثقة. عند الاقتراب منه يظهر ميل لقطع/إنهاء التفاعل وينحو عموماً لعزل نفسه
7	غاية في الشدة	لا يمكنه الانخراط/المشاركة في الأنشطة الاجتماعية بسبب الشعور العميق/الشديد بالخوف، الغضب أو ضلالات الاضطهاد. يتجنب كل التفاعلات ويبقى منعزل عن الآخرين

ع 10 فقد التوجهان/التوهان (ضعف الوعي بالعلاقات والمحيط، يتضمن الأشخاص، الأماكن والوقت نتيجة للتشويش/الارتباك أو الإنسحاب)

1 هل تعرف في أي يوم نحن اليوم؟...............

2 الشهر؟............... 3 السنة؟...............

4 الفصل؟............... 5 التاريخ؟...............

6 وأين نحن/المكان؟...............

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	التوجه العام ملائم/كافي، ولكن قد يكون عنده صعوبة في بعض الأشياء الخاصة مثل يعرف مكانه ولكن لا يعرف اسم الشارع، يعرف أسماء طاقم المستشفى الذي يتعامل معهم ولكن لا يعرف وظائفهم، يعرف الشهر ولكنه يلخبط في أي يوم من الأسبوع. قد يكون هناك ضيق في الاهتمامات ملحوظ بالألفة مع القريبين وليس المحيط الأوسع (يعرف طاقمه الطبي ولكن لا يعرف وزير الصحة/المعارف مثلاً)
4	متوسط	فقط نجاح جزئي في التعرف على الأشخاص، الأماكن والوقت؛ مثلاً يعرف أنه في مستشفى ولكن لا يعرف أسمها، يعرف اسم المعالج النفسي الرئيسي ولكن لا يعرف الكثير من الذين يعملون مباشرةً في رعايته، يعرف السنة ولكنه ليس متأكد من الشهر
5	أشد من متوسط	رسوب/فشل واضح في التعرف على الأشخاص، الأماكن والوقت؛ مثلاً لديه فقط مفهوم غامض حول مكانه، لا يعرف أو غير متألف مع معظم الأشخاص في محيطه. ممكن يعرف السنة ولكن ليس الشهر أو اليوم أو الفصل
6	شديد	رسوب/فشل ملحوظ بشدة في التعرف على الأشخاص، الأماكن والوقت؛ مثلاً (لا يعلم بمكانه، يلخبط في التاريخ، يستطيع أن يسمي 1 أو 2 من الأشخاص في حياته الآن)
7	غاية في الشدة	توهان كامل بالنسبة للأشخاص، الأماكن والوقت. تشويش إجمالي أو تجاهل تام حول الموقع، السنة الحالية وحتى الأشخاص المألوفين له، مثل الوالدين، الزوج/ة، المعالج وأخرين

<u>س5:</u> صعوبة في التفكير التجريدي (تعطل في التفكير التجريدي/الرمزي، كالملاحظ في صعوبة التصنيف، التشكيل، التعميمات والتحرك أبعد من التفكير الجامد أو الأحادي/ في مهام حل المشكلات)

الآن سأقول لك زوجين من الكلمات وأريد منك أن تخبرني بأي شكل هما متشابهان (وجه الشبه بينهما):

مثلاً؛ التفاحة والموزة كيف يتشابهان، ماهو الشيء المشترك بينهما؟ إذا أجاب كلاهما فواكه.. أجب أحسنت .. هيا نبدأ .. ماذا عن:

أما إذا أجاب بطريقة جامدة/متماسة/سطحية؛ مثل الأثنين لهما قشرة، الأثنين نأكلهم ، الأثنين صغيرة الحجم أو القرد يحب أكلها وهكذا فقل له حسناً ولكن هما الاثنتين فواكه

* <u>ملحوظة هامة</u>: (يتم سؤال المفحوص عن ثلاثة أزوج متنوعة حسب فترة إقامته في المستشفى ومدى حدة حالته)

المشابهات	الزوج الأول	الزوج الثاني	الزوج الثالث	الزوج الرابع
تقييم عند سنتين	الكرة والبرتقالة	الطاولة والكرسي	الساعد والساق	الرسم والشعر
عند البداية/ تقييم عند 6 أشهر	التفاحة والموزة	النمر والفيل	الوردة/الزهرة والخزامي	التلة/الهضبة والوادي

237

تقييم سنة واحدة/ الخروج/ تقييم عند 18 شهراً	القلم والمرسام	القبعة والبلوزة	العم/الخال و ولد العم/الخال	الهواء والماء
تقييم وحدة الحالات الحادة	القرش والهللة	الحافلة والقطار / أو السيارة والطائرة	الشمس والقمر	السلام والرخاء/الرفاهية

أما الآن سنتحدث عن بعض الأمثال الشعبية أو الحِكَم المأثورة والتي هي عبارة عن أقوال قديمة مثلاً: كثرة الطباخين تفسد الطبق (كثرة الغسيل ما يبيض الفحم)، ماذا يعني هذا المثل فعلياً؟ وكذلك ؛ لا تحكم على الكتاب من عنوانه (خير الكلام ما قلّ ودلّ)، ماهو المعنى العميق من وراء هذا المثل؟

أعطه فرصة للإجابة وساعده قليلاً في البداية ومن ثم أختر **زوجين أثنين** من القائمة التالية تتدرج من حيث صعوبة المعنى!

والآن هيا لنبدأ:

المجموعة الرابعة	المجموعة الثالثة	المجموعة الثانية	المجموعة الأولى	
غرزة واحدة في وقتها تحفظ تسع الوقاية خير من العلاج	ماينَاسب ذكر الوز يناسب الأنثى كلاً على جنسه يطرب	لا تحكم على الكتاب من عنوانه خير الكلام ما قلّ ودلّ	بسيط كما وجود خشمك في وجهك ما يمسح دمعتك غير يداك	سهل
حجرة مستديرة/متحركة لا تصنع مستنقع يد واحدة ما تصفق أيش يأخذ الريح من البلاط	العشب يبدو دائماً أكثر خضاراً من الجانب الأخر لا تبنى حكمك على التسرع والظن	طعام شخص هو سم لشخص أخر الضربة التي ما تقتلك تقويك	حمل قطعة على كتفك جه يكحلها عماها مش كل مره تسلم الجرّة	
لا يسقط البلوط أبداً بعيداً عن الشجرة لا تسقط التفاحة بعيداً عن شجرتها	لا تحفظ البيض كله في سلة واحدة من يطارد عصفورين يفقد أحدهما	ليس كل ما يلمع ذهباً وليس كل ما يبرق فضة	راسين أفضل من واحد في الاتحاد قوة/ أو لا خير في يمنى من غير يسار	صعب
الناس التي بيتها من زجاج ما ترمي الأخرين بالطوب من عاب أبتلى	طائر سنونو واحد لا يجلب الصيف لا تبنى السقف قبل الأساس لو كانت حتمطر كانت غيمت	لا تقطع الجسر حتى تصل إليه لا تفسد أمراً لا يمكنك اصلاحه	كثرة الطباخين يفسد الطبق كثرة الغسيل ما يبيض الفحم	

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	ينحو/يميل ليعطي معنى حرفي أو تفسير شخصي لبعض الأمثال الصعبة، وبعض الإشكالية مع المفاهيم التي تعتبر تجريدية باعتدال أو بعيدة الصلة
4	متوسط	غالباً يستخدم نسق/أسلوب جامد/سطحي (كأن يعيد نفس الكلام). صعوبة مع معظم الأمثال وبعض التصنيفات/المتشابهات. يميل ليكون مشوش بواسطة الجوانب الوظيفية والأنماط الصامتة
5	أشد من متوسط	يتعامل بصفة عامة بنسق/أسلوب جامد/سطحي، يعرض صعوبة في معظم الأمثال والتصنيفات/المتشابهات
6	شديد	غير قادر على التقاط المعنى التجريدي من الأمثال أو التعابير الشكلية ولكنه يستطيع تشكيل التصنيفات فقط لأكثر المشابهات بساطة. التفكير إما يكون مشغول أو مقفل عن الجوانب الوظيفية، يميل للأنماط الصامتة والتفسيرات الغريبة
7	غاية في الشدة	فقط يستخدم النسق/الأسلوب الجامد/السطحي. لا يدرك مغزى الأمثال، الاستعارات المجازية العامة أو التصنيفات البسيطة والمتشابهات. وأيضاً لا يستخدم العزو الوظيفي والصامت كأساس للتصنيفات. هذا المعيار ينطبق على الأشخاص الذين لا يستطيعون حتى التفاعل بقلة مع المقابل (الاخصائي) نتيجة للضعف/التعطل المعرفي/العقلي الواضح والملحوظ

ع9: محتوى التفكير الشاذ/غير العادي (التفكير يتشكل أو يصنف بواسطة الأفكار الشاذة الغريبة، والتي تتأرجح من تلك البعيدة/الشاذة إلى الأخرى المشوشة والمستغلة)

‏_____ : :

1 هل شعرت بالإنزعاج من أي شيء مؤخراً؟..

2 هل من الممكن أن تخبرني شيئاً بخصوص أفكارك عن الحياة وأهدافها؟.....................................

3 هل تستطيع قراءة أفكار الآخرين؟.................. وهل يستطيع الآخرين قراءة أفكارك؟..................

4 كيف يمكنهم ذلك؟.............................. من يتحكم بأفكارك؟..............................

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	محتوى الأفكار قد يبدو غريباً أو شاذ، أو الأفكار المألوفة/العادية يتم تشكيلها في قالب شاذ/غريب
4	متوسط	الأفكار يتم تشويهها بشكل متكرر وفي بعض الأحيان تكون شاذة قليلاً
5	أشد من متوسط	يعبر عن أو يعرض العديد من الأفكار الغريبة والمدهشة (مثل: كونه طفل مُتبنى من قبل ملك، كونه هارب من حكم بالإعدام) أو بعض الأفكار السخيفة وغير المعقولة
6	شديد	يعبر عن أو يعرض العديد من الأفكار السخيفة وغير المنطقية أو البعض منها ذو طابع ونوعية غريبة/شاذة متميزة (مثل: كونه صاحب 3 رؤوس، أو كونه زائر من كوكب آخر)
7	غاية في الشدة	التفكير ممتلئ/مفعم بالأفكار السخيفة، الشاذة/الغريبة والمتنافرة

س3: ضعف/سوء العلاقات/الصلات (فقدان التعاطف الشخصي، وفقدان الانفتاح في المحادثة والإحساس بالقرب، الاهتمام، الانخراط/المشاركة مع المقابل (الاخصائي). يمكن ملاحظته بوضوح من التباعد الشخصي، وقلة التواصل اللفظي وغير اللفظي)

_____ : :

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	المحادثة مشخصنة تتميز بنغمة متكلفة، رسمية أو مصطنعة. قد تفقد العمق العاطفي/الانفعالي أو تنحو لتكون على مستوى غير شخصي وفكري
4	متوسط	عادةً منعزل، مع مسافة شخصية ملحوظة وواضحة نوعاً ما. قد يجيب على الأسئلة بطريقة ميكانيكية، يتصرف بملل أو يعرض/يبدي عدم اهتمام
5	أشد من متوسط	عدم المشاركة/الانخراط الظاهر والذي يعق/يعطل نتاج المقابلة. ربما يميل لتجنب التواصل بالعين أو الوجه
6	شديد	بصورة واضحة غير مبالي مع مسافة شخصية ملحوظة. الاجابات سطحية/غير حماسية، وهناك أدلة قليلة غير لفظية عن المشاركة/التفاعل
7	غاية في الشدة	تماماً لا يساهم أو ينخرط مع المقابل (الاخصائي)، يظهر غير مبالي بشكل كامل وبوضوح يتجنب التفاعل اللفظي وغير اللفظي أثناء المقابلة

س2: الإنسحاب الانفعالي(فقدان الاهتمام، والمشاركة مع فقدان الالتزام الفعّال مع أحداث الحياة)

_____ : :

* المريض لا ينشئ فعل ما ولا يملك المبادءة ، قليل الاهتمام بالأنشطة والمحيط من حوله ويكون منفصل انفعالياً عنها بوضوح، قد ينخرط مع المحيطين أن طلب منه ذلك. يعتبر سهل أو صعب الانقياد.

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	عادة يفتقد المبادءة وفي بعض الاحيان قد يعرض نقص اهتمام بالأحداث المحيطة
4	متوسط	بشكل عام منفصل عاطفياً عن المحيط وتحدياته، ولكن بالتشجيع قد يتفاعل
5	أشد من متوسط	بوضوح منفصل عاطفياً عن الأشخاص والأحداث في محيطه، ويقاوم كل مجهود/جهد لجعله يتفاعل. يظهر متباعد/غير ودي، سهل الانصياع/الانقياد وبدون هدف لكن يستطيع المشاركة والتواصل ولو بشكل بسيط وقصير ويميل لتأدية الاحتياجات الشخصية في بعض الاوقات مع المساعدة
6	شديد	ضعف ملحوظ وواضح في الاهتمامات والالتزامات العاطفية والتي تنتج محادثات محدودة مع الأخرين و إهمال متكرر في الوظائف الشخصية والتي تتطلب إشراف
7	غاية في الشدة	غالباً يظهر منسحب بشكل كامل، غير متفاعل، ومهمل في احتياجاته الشخصية كنتيجة للنقص العميق في الاهتمامات والالتزامات العاطفية

إ2: فوضى/عدم التنظيم الإدراكي (عمليات التفكير غير منظمة والتي تتميز بتعطل تسلسل الأهداف الموجّه؛ مثل: الإطناب/التطويل، الالتماس، الترابطات الفضفاضة/المتراخية، عدم وجود قضية، منع تدفق الأفكار أو اللامنطقية الإجمالية)

_____ : :

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	يطنب/يسترسل في تفكيره المتماس وغير المنطقي. عنده بعض الصعوبة في توجيه أفكاره بتجاه هدف معين، وبعض من الترابط الفضفاض الذي يمكن ملاحظته تحت الضغط
4	متوسط	قادر على تركيز أفكاره عندما يكون الموقف التفاعلي قصير ومنظم، ولكن يصبح فضفاض/متراخي وغير مطابق/ليس ذو صلة عندما يتعامل مع مواقف تفاعل مركبة أو عندما يكون تحت ضغط خفيف
5	أشد من متوسط	بالعموم لديه صعوبة في تنظيم أفكاره والملاحظة عن طريق الأفكار غير المتطابقة/ليست ذات صلة والتي تظهر بصورة متكررة، الانفصال أو الارتباطات الفضفاضة/المتراخية حتى عندما لا يكون تحت الضغط
6	شديد	التفكير خارج عن مساره بجديّة وغير متسق داخلياً، تنتج في كون الافكار إجمالياً غير ذات صلة وهناك تعطيل لعمليات التفكير والتي تظهر بصورة واضحة ومستمرة
7	غاية في الشدة	الافكار مشوهه لدرجة تكون فيها متنافرة. وجود واضح للارتباطات الفضفاضة/المتراخية والتي تنتج رسوب/فشل تام في التواصل؛ مثل: كلام كثير عشوائي خالي من أي مفهوم أو خرس

ع7: التدهور الحركي (قلة النشاط الحركي المنعكس بواسطة التباطؤ/البطء أو تخبط الحركة وتضاؤل الحديث كإستجابة للمثيرات ونقص/قلة لغة الجسد)

_____ : :

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	نقصان بسيط في معدل الحركة والكلام ولكنه ملحوظ؛ وقد تكون المحادثات والإيماءات غير مثمرة
4	متوسط	بطء واضح في الحركة والكلام وقد يكون مميز بضعف الإنتاجية، طول كمون الاستجابة، التوقف المطول أو بطئ التقدم
5	أشد من متوسط	نقصان شديد/ملحوظ في النشاط الحركي يجعل الاتصال غير مثمر بطريقة قوية أو يَحد من الأداء في المواقف الاجتماعية والوظيفية. تجده عادةً إما جالساً أو متمدداً
6	شديد	الحركة بطيئة بحدة ينتج عنها القليل جداً من الانشطة والكلام. بالضرورة يقضي يومه بدون عمل/إهمال أو متمدد
7	غاية في الشدة	معظم الوقت غير متحرك تماماً وفعلياً غير مستجيب للمثيرات الخارجية

س6: إنعدام العفوية/التلقائية ومتابعة/مواصلة المحادثة (نقص فى متابعة التواصل العادي المصحوب بالخمول، إنعدام الإرادة، الدفاع أو التشوه المعرفى. وهو يتميز أو يلاحظ بتضاؤل الانسيابية وانتاج العمليات اللفظية التفاعلية)

_____ : :

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	المحادثة معه تُظهر مبادءة قليلة. الاجابات تنحو لتكون مختصرة وغير منمقة/مرتبة، والتي تتطلب أسئلة مباشرة وموجه بواسطة المقابل (الأخصائي)
4	متوسط	المحادثة تفتقد الانطلاق/المتابعة الحرة وتظهر متفاوتة ومعوجة. الأسئلة الموجه مطلوبة بتكرار/استمرار للحصول على الإجابات الملائمة/الكافية ولمتابعة سير المحادثة
5	أشد من متوسط	يعرض نقص/فقدان ملحوظ في التلقائية/العفوية والانفتاح، يرد على أسئلة المقابل (الأخصائي) بجملة أو جملتين فقط
6	شديد	الاستجابات محدودة بكلمات قليلة أو عبارات قصيرة وينحو للامتناع أو لبتر/قطع التواصل (مثل: لا أعرف، ليس لدي الخيار/الحرية لأقول ذلك). المحادثة متعطلة بجدية كنتيجة لذلك والمقابلة غير مثمرة أبدأ
7	غاية في الشدة	معظم الوقت الناتج اللفظي مقيد/محدود والتعبير/الحديث عرضي مما يجعل المحادثة مستحيلة

س7: التفكير النمطي/الجامد (تقلص الانسيابية، التلقائية والمرونة في التفكير، والملحوظة فى محتوى الأفكار المتزمت، المتكرر أو العقيم/غير المثمر)

_____ : :

1	غائب	هذا العرض لا ينطبق

2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	بعض الجمود المشاهد في الاتجاه أو المعتقدات. ربما يرفض أن يأخذ بعين الاعتبار موقف بديل/مخالف أو لديه صعوبة في التحول من فكرة لأخرى
4	متوسط	المحادثة تدور حول موضوع مكرر/خالي، ينتج صعوبة في التحول لموضوع جديد
5	أشد من متوسط	التفكير جامد ومتكرر حول نقطة ما بغض النظر عن المجهود الذي يبذله المقابل (الأخصائي)، المحادثة محدودة فقط في موضوعين مسيطرين أو ثلاثة
6	شديد	تكرار غير متحكم فيه للمطالب، الأوضاع، الأفكار أو الأسئلة والتي تعطل المحادثة بشكل حاد
7	غاية في الشدة	التفكير، السلوك والمحادثة مسيطر عليها بواسطة تكرار مستمر لفكرة ثابتة أو عبارات محدودة والتي تقود إلى جمود إجمالي، تواصل مقيد وغير مناسب/ملائم

س1: العاطفة/الانفعالات المسطحة (تضاؤل الاستجابات الانفعالية/العاطفية تتميز بنقص/ضعف تعابير الوجه، تضمين/تعديل المشاعر، والإيماءات التفاعلية)

_____ : :

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	التغيرات في تعابير الوجه والإيماءات التفاعلية تبدو ثابتة، مُجبرة، مصطنعة، وعاجزة عن التضمين/التعديل
4	متوسط	نقص/قلة في تعابير الوجه وقلة الإيماءات المعبرة ينتج عنها مظهر فاتر/بليد
5	أشد من متوسط	التأثر/العاطفة مسطحة بشكل عام، مع تغيرات عرضية فقط في تعابير الوجه وندرة الإيماءات التفاعلية
6	شديد	تسطح ملحوظ وعجز في إظهار الانفعالات معظم الوقت. قد يكون هناك تصرفات عاطفية شديدة غير متضمنة/معتدلة، مثل: الإثارة، الغضب الشديد أو الضحك غير المناسب وغير المتحكم فيه
7	غاية في الشدة	التغيرات في تعابير الوجه والإيماءات التفاعلية الملاحظة تكون غائبة/منعدمة فعلياً. يظهر وكأنه يعرض تعابير عديمة الحيوية/متبلدة أو عقيمة/غير مثمرة

إ4: التهيج/الإثارة (فرط النشاط المنعكس في السلوك الحركي المتعجل/المتسّرع، الاستجابة المضاعفة/المبالغ فيها للمثيرات، اليقظة الزائدة، أو المزاج غير المستقر المبالغ فيه)

_____ : :

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	ينحو ليكون متهيج قليلاً، يقظ، أو مثار بشدة خلال المقابلة، ولكن مع بعض الفصول/الحلقات المميزة من الإثارة أو المزاج غير المستقر الملحوظ
4	متوسط	التهيج أو الإثارة الشديدة واضحة ملحوظة على طول مسار المقابلة، والتي تؤثر على الكلام الحركة العامة أو حلقات من الهيجان/الثورة تظهر بشكل متقطع
5	أشد من متوسط	فرط نشاط ذو مغزى/مميز أو ثورات متكررة من النشاط الحركي ملاحظة، تجعل من الصعبة على المريض أن يجلس أو يستقر لفترة لا تزيد عن عدة دقائق في أي وقت
6	شديد	تهيج/إثارة ملحوظة تسيطر على المقابلة، وتحد من الإنتباه و لحد بسيط تؤثر على الإداء الشخصي مثل: الأكل أو النوم
7	غاية في الشدة	تهيج/إثارة ملحوظة وبخطورة تتداخل/تعيق الأكل والنوم وتجعل التواصل الشخصي مستحيل فعلياً. عجلة في الكلام ونشاط حركي ينتج عنه عدم ترابط وإعياء/إنهاك

ع5: السلوكيات/التصرفات ووضعية الجسد/الحالة (حركات غير طبيعية أو وضعية ظاهرة تتميز بالخطورة، الثبات، عدم التنظيم أو المظهر الشاذ)

_____ : :

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص

		(الطبيعيين)
3	معتدل/خفيف	صعوبة بسيطة في الحركة أو جمود قليل في وضعية الجسد
4	متوسط	الحركة صعبة بشكل ملاحظ أو مفككة/غير مترابطة أو تكون وضعية الجسد غير طبيعية بشكل متواصل لفترات قصيرة
5	أشد من متوسط	طقوس غريبة/شاذة بشكل عرضي أو تكون وضعية الجسد ملتوية بشكل ملاحظ، أو تكون غير طبيعية/شاذة بشكل متواصل لفترات ممتدة
6	شديد	طقوس و تصرفات غريبة/شاذة بشكل متكرر، أو حركات نمطية، أو وضعية الجسد ملتوية بشكل متواصل لفترات ممتدة
7	غاية في الشدة	الأداء متعطل بشكل جدي وخطير والتي تتضمن حركات شعائرية، نمطية أو منمقة/مصطنعة، أو عن طريق وضعية جسد غير طبيعية وثابتة والتي تتواصل وتستمر معظم الوقت

ع14: ضعف التحكم في الاندفاعات (يكون هناك اضطراب في النظم/القواعد و في التحكم عند التصرف/ردة الفعل للحث/الدافع الداخلي، والذي ينتج عنه استبداد مفاجئ، غير متضمن/غير قابل للتعديل، أو التفريغ المهدور للتوتر والانفعالات بدون مراعاة للعواقب/النتائج)

_____ :   :

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	يميل للشعور بالغضب والرعب بسهولة عندما يواجه ضغط أو يرفض/ينكر الإبهاج ولكن نادراً ما يتصرف باندفاع
4	متوسط	يغضب ويهدد لفظياً بسبب تحفيز ضئيل/قليل. وقد يكون ذلك يسبب تهديد بشكل عرضي، مشتت، أو يدخل في حلقة أو اثنتين من التحدي الجسدي أو العراك البسيط
5	أشد من متوسط	يظهر حلقات متكررة من الاندفاعية تتضمن إساءة لفظية، تشتيت في الأولويات، أو تهديد جسدي. وقد يكون هناك حلقة أو اثنتين من التهجم الخطير/الجدّي والذي يتطلب عزل، تسكين أو سيطرة جسدية
6	شديد	يكون عدواني مندفع بشكل متكرر ومهدد ومتطلّب ومتشتت بدون مراعة للعواقب. يبدي سلوك تهديدي ومن المحتمل أن يستجيب للأوامر الهلوسية
7	غاية في الشدة	يعرض هجوم عدائي، تهجم جنسي، تكرار للوحشية، أو سلوك التشتت الذاتي، يتطلب أشراف مباشر مستمر أو قيود خارجية بسبب العجز في التحكم في الاندفاعات الخطيرة

ع4: التوتر (يكون هناك مظاهر جسدية مكشوفة/ظاهرة من الخوف، القلق، والتهيج، مثل: العناد، الرعشة/الرجفة، التعرق الشديد و الإنهاك/عدم الراحة)

_____ :   :

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	وضعية الجسد والحركات تشير إلى الشعور بالقلق الخفيف، مثل: الجمود القليل، عدم الارتياح العرضي، تغيير الوضعية، أو رعشة اليد المتسارعة
4	متوسط	مظهر عصابي واضح ينشئ من مظاهر واضحة، مثل: السلوك القَلِق، رعشة اليد الواضحة، التعرق الشديد، أو التصرفات العصابية
5	أشد من متوسط	التوتر المؤكد ملاحظ عن طريق العديد من المظاهر، مثل: الاهتزاز العصابي، التعرق الغزير وعدم الارتياح، ولكن السلوك/التصرف أثناء المقابلة ليس متأثر بشدة
6	شديد	توتر مؤكد للدرجة التي تعطل العلاقات الشخصية، مثل: السلوك القَلِق/التململ العصابي المستمر، لا يجلس بشكل مستقر لفترة طويلة، أو يظهر فرط نشاط
7	غاية في الشدة	توتر ملاحظ بقوة والذي يظهر بواسطة اشارات من الرعب أو التسارع الحركي الاجمالي، مثل تسارع وعدم هدوء يؤدي إلى عدم القدرة على البقاء جالساً لفترة لا تطول عن دقيقة، والتي تجعل المحادثة المتواصلة غير ممكنة

ع8: عدم إظهار روح التعاون (الرفض الفَعال للامتثال لرغبات الأخرين المهمين، والمتضمنين كالمقابل، طاقم المستشفى، أو العائلة، والذي من الممكن أن يكون مرَفق بعدم الثقة، المدافعة/المقاومة، عناد/صلابة، سلبية، رفض السلطة، الغضب، أو العداء)

_____ :   :

| 1 | غائب | هذا العرض لا ينطبق |
| 2 | ضئيل | مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين) |

3	معتدل/خفيف	يمتثل/يطيع مع الاتجاه بالاستياء، عدم الصبر، السخرية/التهكم، والذي قد يعترض الاستجواب الحسّاس أثناء المقابلة بطريقة غير مؤذية
4	متوسط	رفض صريح عرضي للامتثال للمطالب الاجتماعية العادية/الطبيعية، مثل: ترتيب السرير، جدولة المواعيد وخلافه، والمريض يبرز عداء، دفاع، أو اتجاه سلبي، ولكن يمكن العمل معه بالعادة
5	أشد من متوسط	لا يمتثل للأوامر في محيطه بشكل متكرر ويُعرف أو يميز من قبل الآخرين بكونه "منبوذ" أو لديه "الاتجاه المشكِّل" بشكل جدي. عدم التعاون معكوس في الدفاع الظاهر أو الانزعاج مع المقابل و عدم الرغبة في الإجابة على الكثير من الأسئلة
6	شديد	غير متعاون بشدة، سلبي، وممكن يكون عدائي. يرفض الامتثال مع معظم المطالب الاجتماعية وربما يكون غير راغب في ابتداء أو أنهاء مقابلة كاملة
7	غاية في الشدة	مقاومة فعّالة والتي تؤثر بجدية على كل المناطق الوظيفية فعلياً. قد يرفض المشاركة في أي من الأنشطة الاجتماعية، الميل للنظافة الشخصية، التحدث مع العائلة أو الطاقم، ويشارك باختصار في المقابلة

ع11: ضعف الانتباه (ضعف التأهب/اليقظة المركز والذي يظهر بضعف التركيز، التشتت من المثيرات الداخلية والخارجية، وصعوبة في الاستغلال، المواصلة، أو تبديل التركيز لمثير جديد)

_____ : _____ :

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	تركيز محدود مشهود بالقابلية العرضية لتشويش تصفية/تعطيل تعثر الانتباه باتجاه نهاية المقابلة
4	متوسط	المحادثة متأثرة بميل المريض ليكون مشوش بسهولة، صعوبة في مواصلة المحادثة لفترة طويلة في موضوع معين/معطى، أو مشكلة تحويل الانتباه لموضوع جديد
5	أشد من متوسط	المحادثة مشوشة/معاقة بشكل جدي بسبب ضعف التركيز، التشتت، والعصوبة في تحويل التركيز بطريقة ملائمة/مناسبة
6	شديد	الانتباه ممكن استغلاله فقط للحظات قصيرة أو مع مجهود كبير، بسبب تشتت ملاحظ بواسطة المثيرات الداخلية والخارجية
7	غاية في الشدة	الانتباه جداً معطل/مشوش لدرجة أن المحادثة المختصرة/القصيرة تكون غير محتمله/ممكنه

ع15: الإنشغال/الانهماك/الاستغراق الكلي (يكون هناك استغراق مع الأفكار والمشاعر المنشأة داخلياً أو الخبرات الأحادية والتي تضر/تعيق التوجه الواقعي و السلوك التكيفي)

_____ : _____ :

1	غائب	هذا العرض لا ينطبق
2	ضئيل	مسار/مسلك مشكوك فيه: المريض يبدو أكثر من طبيعي (ولكن بوجود شبه مرئي لهذه العرض كما في الأشخاص الطبيعيين)
3	معتدل/خفيف	الانشغال الشديد/المبالغ فيه بالاحتياجات أو المشاكل الشخصية، مثل: تلك التي تنجرف للمواضيع الذاتية وتضاؤل الاهتمام الظاهر الموجه للآخرين
4	متوسط	يظهر متشبع/مستغرق ذاتياً، كما لو يكون مستغرق في أحلام اليقظة أو الاستغراق في الخبرات الداخلية، والتي تعطل التواصل لدرجة ضئيلة
5	أشد من متوسط	عادةً يظهر ليكون مشغول بالخبرات الأحادية، والملاحظة في السلوك الذي يتطفل بقوة على الوظائف الاجتماعية والتواصل، مثل: التحديق الخالي من التعبير، الهمهمة أو التحدث للذات، أو الاستغراق في المظاهر الحركية النمطية
6	شديد	انهماك كلي ملاحظ في الخبرات الأحادية والتي تحد من التركيز بشكل شديد وجدّي، المقدرة على التحدث، والتوجه نحو المحيط. بشكل متكرر يُلاحظ يبتسم، يضحك، يهمهم أو يتكلم مع نفسه أو يصرخ عليها
7	غاية في الشدة	استغراق تام بالخبرات الأحادية، والتي بالتأكيد تؤثر على كل مسارات السلوك. وممكن بشكل مستمر يستجيب لفظياً وسلوكياً للهلاوس ويعرض وعيّ قليل بالأشخاص الآخرين والمحيط الخارجي