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Clinical and non-clinical auditory verbal hallucinations; a psychological and functional imaging study of the psychosis continuum

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Clinical and Non-Clinical Auditory Verbal Hallucinations:

A Psychological and Functional Imaging Study of the Psychosis Continuum

Katy Thornton

Thesis submitted for the degree of Doctor of Philosophy

University of Bangor

2009



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Abstract

The aims of this thesis were two-fold: to examine the phenomenology of auditory verbal hallucinations (AVH) and to compare the experiences of voice-hearers who have, and do not have, a need for care. The theoretical foundations of the thesis lie in psychological models of psychosis which suggest that voices are not essentially pathological and that distress results from beliefs about voices that are influenced by life history. Forty voice-hearers were recruited, half of whom had a psychiatric diagnosis and had received treatment for their voices and half of whom who had no need for care in relation to their voices and no psychiatric history. All participants completed interview and questionnaire measures of their experiences of voices, beliefs about voices and life history. Ten voice-hearers (three of whom were clinical participants) were scanned using functional magnetic resonance imaging whilst they were hearing voices. The results of the three studies were largely consistent with each other and previous research and theory. The two groups' voices were similar in topography and biological basis but the clinical group's voices were more negative in content and caused more distress and disruption. There were significant group differences on a number of cognitive and environmental variables; the clinical group had more negative beliefs about voices, thoughts and other people as well as more negative life histories involving interpersonal trauma and relationship difficulties. Mediational analyses suggested that adverse life experiences (trauma and insecure attachment) influence the distress associated with voices, through their influence on beliefs about voices. The thesis concludes with a discussion of the current findings and the consequent implications for future research on AVH and their treatment.

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Chapter 1: Clinical and Non-Clinical Auditory Verbal Hallucinations: Exploring the Psychosis Continuum

1.1 The psychosis continuum

Throughout history there have been reports of individuals experiencing unusual phenomena which are not experienced by others within their culture. Such experiences have traditionally been viewed as supernatural in origin but in the modern Western world they have been understood as symptoms of discrete mental illnesses such as schizophrenia or bipolar disorder (Leudar & Thomas, 2000; Foucault 1961/2001; Porter, 2002). Modern psychiatry has its foundations in the work of Kraepelin, who devised a system of classification for mental illness, believing that diseases such as dementia praecox (later renamed schizophrenia by Bleuler) consisted of specific symptoms such as hallucinations and delusions which were caused by biological pathology (Bentall, 2003). Under this system there are clearly marked boundaries between those who are sane and those who are mad. However, there is an alternative to this categorical view of mental health which postulates continuity between mental health and mental ill health. This dimensional view has gained much support in recent years but it is not a new idea. Even one of Kraepelin's contemporaries, Bleuler, believed that there was a link between normality and mental illness, suggesting that psychosis was the extreme expression of a continuum of thoughts and behaviours. Different labels have been used to describe states on the continuum below the extreme end of psychosis, such as schizotypy, psychosisproneness, sub-clinical psychotic experiences and at-risk mental states.

A dimensional representation of psychosis is widely accepted but there are different views on how it should be conceptualised, either as a quasi-dimensional (disease-based) or a fully dimensional (personality-based) model. These differing perspectives are illustrated in Figure 1.1. The quasi-dimensional perspective has its roots in the work of Bleuler and was developed by psychologists like Rado (1953) and Meehl (1962) who believed that schizotypy represented an attenuated form of disease, namely schizophrenia. An entirely different perspective was adopted by Eysenck, influenced by Kretschmer's (1925) work on associations between personality types

and clinical disorders. Eysenck (1960) proposed that mental disorders, including psychosis, represented the upper end point of a continuum of personality traits.



Figure 1.1 Diagram depicting quasi-dimensional and fully dimensional continuity models of schizotypy and schizophrenia, taken from Claridge and Beech (1995), p194.

More recently, Claridge (e.g. Claridge & Beech, 1995) has proposed what he calls the fully dimensional model, which combines elements of both the quasi-dimensional and dimensional approaches. In this view, schizotypy is normal personality variation but it can lead to psychotic disorder given the right risk circumstances. Claridge has compared this idea to examples of systemic physical diseases that represent extremes of normal variation e.g. blood pressure varies in the population and the highest levels are labelled hypertension. Psychological and environmental factors such as stress, poor diet and smoking can increase blood pressure to dangerous levels where there is a discontinuity from the normal variation in the form of a stroke or a heart attack. Extending this idea to psychosis, there is normal variation of schizotypy in the population and psychological or physical risk factors such as trauma or cannabis can induce a psychotic breakdown. In this model, the concept of schizotypy is described in neutral terms (as opposed to the quasi dimensional model, which assumes it is related to disease) in that it can be related to psychotic disorder but also can have

benign outcomes such as in the cases of spiritual experience (Jackson, 1997), out of body experiences (McCreery & Claridge, 2002) or creativity (Nettle, 2006).

Empirical evidence supports the notion of psychosis as a dimensional rather than a categorical concept (van Os, Linscott, Myin-Germeys, Delespaul & Krabbendam, 2009). van Os et al. (2009) conducted a systematic review of studies of the incidence and prevalence of sub-clinical psychotic experiences in the general population, finding an average prevalence rate of 5% and an average incidence rate of 3%. Thus there are significantly more people having psychotic experiences such as hallucinations and delusions in the general population than there are people diagnosed with clinical disorder. This analysis was restricted to quantitative examination of clinical and non-clinical psychotic experiences and so does not give any indication of how these experiences may differ in qualitative terms, for example, their content or impact upon the experient. Similar risk factors for developing psychotic experiences were found for both clinical and subclinical experiences, namely trauma, drug use, male sex and migrant status. The vast majority of these subclinical experiences (75-90%) were short-lived and for those whose experiences continued, only a subset developed clinically relevant disorder given certain environmental risk factors such as trauma, cannabis and living in urban environments.

Research on the psychosis continuum is characterised by the underlying theoretical stance of the investigators. Differentially viewing the continuum as either quasi or fully dimensional will influence the nomenclature used, the populations sampled and the research methodology. Whereas researchers aligned to the quasi-dimensional perspective are interested in investigating 'symptoms' in populations with 'at risk mental states' using psychiatric interviews, those more aligned to the fully dimensional perspective examine experiences like 'hearing voices' and 'unusual beliefs' in the general population using more neutral means such as qualitative methodology.

1.2 Psychological models of psychosis

The conception of psychosis as a dimensional construct rather than an all-or-nothing phenomenon is consistent with recent cognitive psychological models of the development and maintenance of psychosis. These models postulate that unusual beliefs and experiences are not necessarily indicative of mental disorder but can become problematic and clinically relevant depending on affective, cognitive, behavioural and social factors. The most widely cited cognitive models of psychosis are those of Garety, Kuipers, Fowler, Freeman and Bebbington (2001) and Morrison (2001) who have both developed models describing processes in the causation and maintenance of positive psychotic symptoms. Bentall and Fernyhough (2008) have developed these ideas to produce individual models for the distinct psychotic experiences of auditory verbal hallucinations (AVH) and paranoid beliefs, emphasising the role of specific social and environmental factors in the production of specific psychotic experiences. Each of these cognitive models will be reviewed here, followed by a review of research that supports their predictions about transitions across the psychosis continuum.

Garety and colleagues' (2001; 2007) model of positive psychotic symptoms

Garety, Kuipers, Fowler, Freeman and Bebbington (2001) proposed a model describing how positive psychotic symptoms develop through, and are maintained by, emotional, cognitive and social factors. Their model is illustrated in Figure 1.2. This model proposes that if an individual with a biopsychosocial predisposition to developing psychosis encounters a stressful triggering event their cognitive processes can be disrupted. Such disruptions can make it difficult to experience mental activity as intended and internally generated which produces anomalous perceptions like thoughts being experienced as voices or thoughts being inserted, or broadcast etc. The model does not consider these anomalous experiences to be psychotic symptoms in themselves, but that they can be transformed into psychotic symptoms given that the individual appraises them and reacts to them in certain ways.

The transition to psychosis can be facilitated by certain emotional and cognitive reactions. Firstly, the advent of anomalous experiences is often accompanied by negative emotional reactions, to both the anomalous experiences themselves (which can be feel threatening and alien) and the event that triggered them. These emotional reactions feed back into the processing of the experiences and influence their content. Cognitive processes are also thought to influence the transition to psychosis, for example, a 'jumping to conclusions' reasoning style and a poor understanding of social situations and other peoples' intentions. Biased appraisal processes are thought

to be particularly important, and these are made worse by negative emotional states. The authors believe that appraising the anomalous experiences as external and personally significant is central to developing psychosis and thus if the individual is able to 'reject the hypothesis of externality' (for example, putting their experiences down to stress or tiredness) they will not become psychotic.

The authors also proposed another route to psychosis which does not necessitate the occurrence of anomalous experiences and thus explains how delusions can occur independently of hallucinations and other psychotic symptoms. In this course the stressful triggering event does not cause cognitive disruption and anomalous experiences but it does induce negative emotional changes. These negative emotional changes directly activate biased appraisal processes and negative interpersonal schemata which facilitate an externalising appraisal for the life event or affective changes.

In addition to cognitive and affective factors, Garety *et al.* noted that adverse social environments contribute to the development and maintenance of psychosis. They suggested that childhood experience of adversity leads to the development of negative interpersonal schemata (e.g. considering the self as vulnerable and others as dangerous) which facilitates low self esteem and externalising appraisals. Once the psychotic appraisal has been developed, those who are socially isolated are less likely to have access to alternative, more normalising explanations.

Similar cognitive, emotional and social factors that contribute to developing the psychotic appraisal also help maintain it. These factors include reasoning processes (e.g. 'jumping to conclusions' thinking style, externalising attributional bias and poor theory of mind); dysfunctional interpersonal schemata and adverse social environments (e.g. negative beliefs about the self and others, low self-esteem, social adversity contributing to negative schemata); emotional processes and cognitive processes associated with emotion (e.g. negative emotions enhance biased appraisals that are consistent with the emotion; anxiety increases the probability that a threatening explanation is accepted; metacognitive beliefs such as belief that thoughts should be controlled increases distress); and the secondary appraisal of the experience

of psychosis itself (illness perceptions influence engagement with treatment, stigmatising appraisal of psychosis influences development of depression).



Figure 1.2 Garety et al.'s (2001) Cognitive model of psychosis, taken from Garety et al. (2007), p 1379

Garety *et al.* (2001) suggested that if cognitive models of psychosis proved useful then their findings should be integrated with neurobiological findings to provide a fuller account of psychosis. In 2007 they revisited their model, describing the research evidence in the intervening six years, and attempted such an integration suggesting that "cognitive models and their derived phenotypes constitute the missing link in the chain between genetic or acquired biological vulnerability, the social environment and the expression of individual psychotic symptoms", Garety *et al.* (2007), p1377.

Morrison's (2001) cognitive approach to positive psychotic symptoms

Morrison has suggested a model of positive psychotic symptoms which draws on previous cognitive models of anxiety disorders. Like Garety *et al.*'s model, this approach views experiences like hallucinations and delusions as nonpathological phenomena that can be transformed into psychotic symptoms depending on the individual's appraisal of them. However, whereas Garety *et al.* believe that psychotic symptoms develop from appraisals of cognitive disruption in those with a biopsychosocial predisposition, Morrison suggests that psychotic symptoms develop from appraisals of normal psychological processes called intrusions. In this respect, Morrison's model is more aligned with fully dimensional approaches to the psychosis continuum whereas Garety *et al.*'s model is more aligned with the quasi-dimensional viewpoint.

Morrison based his model of psychosis on cognitive models of anxiety, which explain how disorder develops from the appraisal of intrusions. Intrusions are unwanted and uncontrollable ego dystonic repetitive thoughts, images or impulses that impinge upon awareness and disrupt attention. Cognitive models of anxiety state that it is the interpretation of intrusions that determine whether disorder develops, for example, cognitive models of OCD (e.g. Salkovskis, 1985) state it is the interpretation of intrusive thoughts and impulses that causes distress, which is maintained by safety behaviours.

Morrison (2001) argued that positive psychotic symptoms can be viewed as intrusions (e.g. AVH) or culturally unacceptable interpretations of intrusions (e.g. delusional beliefs). It is the interpretation that determines the cognitive, behavioural and affective reaction to intrusions and affects the subsequent occurrence of more intrusions. Thus, the same experience e.g. hearing your name being called repeatedly, will provoke different reactions from different people who interpret it as being caused by overtiredness, a guardian angel or an evil entity, respectively. These three interpretations would result in different reactions e.g. resolving to get more sleep and to forget about the experience or feeling reassured about some personal problem or feeling tormented and becoming hypervigilant. Morrison suggests that it is the cultural unacceptability of interpretations that defines them as psychotic.

According to Morrison, culturally unacceptable interpretations are determined by faulty self and social knowledge (e.g. declarative beliefs about the self and others, beliefs about voices, metacognitive beliefs and procedural beliefs about information processing) which are, in turn, influenced by experience. He argues that experience influences belief formation which, in turn, influences the nature of interpretations of intrusions, for example, sexual or physical abuse will lead to beliefs about others being untrustworthy and can make paranoid interpretations of ambiguous events more likely. Morrison also argues that certain kinds of adverse experiences (e.g. sleep deprivation, drug use, bereavement, childhood trauma) will increase the rate of intrusions.

A number of factors will increase the experience of intrusions and their culturally unacceptable interpretations including mood (arousal, anxiety, sadness, anger) and physiological influences (sleep deprivation, drug use) and cognitive and behavioural responses (e.g. selective attention and heightened self-focus, safety behaviours that remove the possibility for disconfirmation of the interpretation and dysfunctional attempts to control thoughts and intrusions) which are guided by procedural beliefs. Morrison suggests that his model is compatible with biological research in psychosis as such factors (e.g. structural, chemical or genetic differences) could result in increased intrusions. His model is illustrated below in Figure 1.3.



Figure 1.3: Morrison's (2001) Cognitive model of psychosis, with a case formulation example of auditory verbal hallucinations, taken from Morrison (2001), p261.

Bentall and Fernyhough (2008) Models of AVH and Paranoid Delusions.

The cognitive models outlined above describe how positive psychotic symptoms develop from cognitive and emotional processes in the context of an adverse environment. However, they describe positive psychotic symptoms generally rather than individual symptoms which has been suggested as a more valid approach to studying psychosis (Bentall, 2003; 2006). Recently Garety *et al.* (2007) have acknowledged that their 2001 model should be refined to explain specific symptoms. Bentall and Fernyhough (2008) have developed individual models for AVH and paranoid delusions, respectively. They have drawn on previous research to describe how specific types of adverse environments, in combination with specific cognitive biases and deficits, can produce specific psychotic phenomena. These models are intended to describe how particular environmental and cognitive factors combine to produce psychotic symptoms but, unlike the two cognitive models described above, no comment is made on the resulting content of these symptoms or the emotional reaction to them.

Using a different type of environmental adversity as a starting point, they build up separate models of AVH and paranoid delusions, respectively, using previous research on the psychological mechanisms involved in each type of symptom. In the case of AVH, the authors propose that those who have pre-existing difficulties with source monitoring are more likely to attribute the unwanted, low effort intrusions caused by trauma externally. This process is facilitated by metacognitive beliefs about the need to control thoughts which lead to dysfunctional attempts to control thoughts, which only produce more intrusions.



Figure 1.4: Bentall and Fernyhough's (2008) Cognitive model of Childhood trauma and AVH, taken from Bentall and Fernyhough (2008), p1014.

Central to the development of paranoid beliefs is the supposition that early adverse experiences of other people lead one to believe that future interactions will be also be negative. Individuals who have insecure attachment styles and repeated experience of victimisation have low self esteem and are more likely to attribute negative events to external powers (perhaps in an attempt to buffer self-esteem) especially if they already have deficits in the ability to understand the mental states of others (poor theory of mind; ToM). These factors lead the individual to become hypervigilant to possible social threats and develop paranoid beliefs, facilitated and maintained by a thinking bias whereby they are quick to make judgements with poor reality testing.



Figure 1.5: Bentall and Fernyhough's (2008) Cognitive model of Attachment and Paranoid beliefs, taken from Bentall and Fernyhough (2008), p1015.

1.3 Support for psychological models of positive psychotic symptoms

Cognitive models of positive psychotic symptoms propose that psychotic experiences in themselves are not pathological but that the individual's cognitive and emotional reactions to them determine whether or not that person develops full blown psychosis with a need for care (Garety *et al.*, 2001; 2007; Morrison, 2001). It is also proposed that key cognitive factors, such as appraisals, are influenced by an adverse environmental background. These factors will be reviewed in greater detail in subsequent chapters (Chapter 2 focuses on cognitive factors and Chapters 3 and 4 focus on environmental factors) but for the purposes of this chapter, a short review of longitudinal evidence for the influence of cognitive and emotional factors on transitions across the psychosis continuum will be presented.

The Netherlands Mental Health Survey and Incidence Study (NEMESIS) is a longitudinal study of the prevalence, incidence and consequences of psychiatric disorders in the Dutch general population (Bijl *et al.*, 1998a; 1998b). Researchers interviewed participants in their own homes using the Composite International Diagnostic Interview (CIDI; Smeets & Dingemans, 1993). They interviewed 7,076 people in 1996 and followed them up for three years (5,618 were available in 1997 and 4,848 were available in 1999). The CIDI section on psychosis consisted of 13 items on delusions and 4 items on hallucinations and each was rated as being not

present, as present but a subclinical symptom (not associated with distress or a need for care) or present and being a 'true psychiatric symptom'. A series of studies were published investigating which factors were important in those who developed clinical psychotic disorders.

It was found that 79 people reported having their first subclinical psychotic experience in the year between the first and second interview and these individuals were followed up two years later (Hanssen, Bak, Bijl, Vollebergh and van Os, 2005). The vast majority of these people reported that their experiences had ceased (84%) and those who were still having them were evenly split between those who continued to have no need for care (8%) and those who had developed clinical psychotic disorder (8%). Those who reported being depressed at the second interview were more likely to have developed clinical disorder, which supports cognitive models' claim that distress associated with psychotic experiences is important in the development to disorder.

A series of studies specifically examining the transition from non-clinical AVH to clinical AVH using NEMESIS data have highlighted the joint influence of dysfunctional cognitive and emotional factors in the development of disorder. Krabbendam, Myin-Germeys, Hanssen, Bijl et al. (2004) found that those who developed delusions after their first experiences of AVH were more likely to develop psychotic disorder than those with no delusional ideation. A second study by these authors showed that those who developed depression were more likely that nondepressed hallucinators to develop clinical disorder however this association was less statistically precise after adjusting for delusional ideation, suggesting that the association is partly mediated by delusional ideation (Krabbendam, Myin-Germeys, Hanssen, de Graaf et al., 2005). Similarly, Hanssen, Krabbendam, de Graaf, Vollebergh & van Os (2005) reported that those who were distressed by their new AVH were more likely to develop delusions that those who did not feel distressed by their AVH. These findings support claims by Garety et al. (2001) that the affect associated with anomalous experiences triggers a search for explanation and this interpretation can be biased by distress.

1.4 Alternatives to current psychological models of psychosis

Jackson (2006) suggests that although current psychological theories of psychosis support the psychosis continuum in recognising that experiences like hallucinations and delusions are not necessarily indicative of mental pathology, their conceptualisation of psychosis is still restricted by a quasi-dimensional focus that 'psychosis implies disorder'. He argues that current psychological understandings of psychosis are biased by a reliance on clinical research which is restricted by sampling only those diagnosed with psychotic disorder. This sample is further limited by only being capable of studying those who are available, able to give consent to participate and who complete research protocols. This sampling bias excludes the examination of those who recover enough ability to function to avoid mental health services in future or who never require treatment and thus the experiences of these individuals are never incorporated into our understanding of psychosis.

Limited by this pathologising bias, Jackson (2006) argues that cognitive models offer little explanation of more benign aspects of psychotic disorder or examples of 'benign psychosis' such as experiences of a spiritual nature or psychotic-like experiences in the context of survival in extreme circumstances. He describes case examples of 'benign psychosis' such as a man who was helped to cope with adverse life events by a voice which he described as 'the cosmic CIA' and the account of Joe Simpson who was guided by a voice which ultimately led to his survival in an extreme situation. Jackson argues that these experiences affirm some aspects of cognitive models in that they involve external and culturally unacceptable appraisals for auditory hallucinations. On the other hand, the experiences described are not like intrusive thoughts and are not ego dystonic, as would be suggested by Morrison (2001) and the notion of cognitive disruption suggested by Garety *et al.* (2001; 2007) is not consistent with the benign and adaptive nature of such experiences.

A more fully dimensional perspective conceptualises psychosis as part of individual variation and separates it from disorder, thus inviting the consideration of theoretical models from outside the clinical domain. Jackson (2001, 2006) suggests a problemsolving model of spiritual experience (Batson & Ventis, 1982) may be applied to psychotic experiences as there are parallels between the two phenomena. According to this construction, spiritual experiences are an adaptive result of unconscious processing of life's problems in the context of a highly stressful period. The spiritual 'solution' to a highly stressful situation appears fully formed and vividly in conscious experience with no subjective experience of them being self-generated. The psychotic features of the experience are seen as constructive in that they produce the 'sense of authority needed to induce a paradigm shift'. Thus, for example, grief can be much better assuaged by the emotional reunion with a dead loved one than by the intellectual consideration of life after death.

Jackson (2006) acknowledges that the conceptualisation of psychosis as an adaptive response to life stress may seem 'absurd' from a clinical perspective as psychotic disorder is clearly a negative and devastating condition for so many but the dimensional perspective shows that the experience is heterogeneous and the problemsolving model can explain how the process can be benign or pathological, depending on whether the process is successful in bridging the impasse or not. The meanings that people make of their experiences will be influenced by social factors and psychotic experiences that are socially validated will be less harmful. Jackson (2006) gives an example of how initially pathological psychotic experiences can be transformed and integrated into more benign and validated concepts through the example of a female psychotic patient who credited her recovery to the joining of a religious group that helped her to value and make sense of her psychotic experiences. Her initial beliefs about being a God-person were validated by the Bahai faith group and turned into the more culturally acceptable idea that God resides within everyone. Those whose psychotic experiences are not validated by others, particularly those that involve 'social conflict, involuntary hospitalisation and compulsory medication' exacerbate the stress which drives the psychotic process, leading to further cycles of unusual experiences with increasing distress and separation from others leading to clinical disorder.

A quasi-dimensional focus on pathological aspects of psychosis obscures the central question arising from a fully dimensional perspective, which is why do some people have benign experiences whereas other people have pathological experiences? Studying and comparing both these types of experience will help to elucidate the factors involved in the development of distress with psychosis and 'need for care'.

1.5 Comparisons of clinical and non-clinical AVH

In line with the continuum model, critics of the categorical model of mental illness have argued that instead of researching erroneous discrete mental disorders like 'schizophrenia' or 'bipolar disorder' it is more valid to take a symptom-orientated approach and examine individual symptoms such as hallucinations, delusions and disordered communication (Persons, 1986; Bentall, 1990; Costello, 1992). In a less medicalised manner, compatible with the fully dimensional perspective, Bentall (2006) has argued that this should be named a 'complaint-orientated' approach. This approach is adopted in the current thesis, which will focus on auditory verbal hallucinations (AVH).

AVH are perhaps the most often studied psychotic experience, they are commonly thought of as pathognomic of schizophrenia by medical professionals (Sartorius, Shapiro & Jablensky, 1974) and perhaps also the layperson as this is the view propounded by the British written media (Leudar & Thomas, 2000). However, it is being increasingly recognised that many members of the general population hear voices in the absence of psychiatric disorder, with estimated prevalence rates of 4-15% (e.g. Romme & Escher, 1989; Tien, 1991; Johns, Nazroo, Bebbington & Kuipers, 2002). Furthermore voices are not always seen as products of mental illness in non-Western cultures (e.g. Prince, 1992; Sodi, 1995; Bhugra, 1996). Further evidence that AVH are not inextricably linked to disorder comes from laboratory studies where AVH have been induced in 'normal' participants (Mintz & Alpert, 1972; Young, Bentall, Slade & Dewey, 1987; Feelgood & Rantzen, 1994).

Epidemiological studies of AVH provide evidence of the frequency of such phenomena in the general population but do not give any indication of the quality of these experiences or whether they are comparable to the AVH experienced by those diagnosed with clinical psychotic disorder. One recent study has attempted to describe the phenomenology of non-clinical AVH (Sommer, Daalman, Rietkerk, Diederen *et al.*, 2008) using a psychiatric interview measure, the Psychotic Symptom Rating Scale (PSYRATS; Haddock, McCarron, Tarrier & Faragher, 1999), which measures characteristics of AVH and delusions. Sommer *et al.* (2008) gave the PSYRATS auditory hallucination subscale to a sample of 103 non-clinical voice hearers that they had recruited through a specialist website. Their mean age was 44 years and most had

been hearing voices since early adolescence (mean age of onset was 14 years). On average they heard three voices a week, fairly frequently. Interestingly, a sizeable minority of these voices would count as 'first rank' symptoms (Schneider, 1959) with 18% of participants hearing commenting voices and 11% experiencing voices talking with each other. The majority of participants never heard negative voices (71%) with a quarter of the sample experiencing both positive and negative voices and 4% only experienced negative voices. As well as being mainly positive, the vast majority of participants said that their voices did not disturb their daily lives (91%) and slightly more than half of them could stop the voices from speaking if they did become inconvenient (55%). Almost 60% of the participants believed that their voices came from external sources, mostly from benevolent spirits. Despite reporting data on most subscales of the PSYRATS, the authors did not report the findings of the two items on distress caused by voices. Despite this surprising omission, the authors did refer to distress in discussing their findings, reporting that only those few participants who heard voices with negative content scored higher on distress and lower on global functioning measures which they interpreted as demonstrating that disability associated with voices was not due to their presence but to their content and the distress that they caused.

The purpose of Sommer *et al.*'s study was to investigate whether AVH are independent of pathology or if they represent attenuated symptoms of schizophrenia. They investigated this issue by giving the non-patient voice hearers a range of psychiatric measurements and compared their results to those obtained from a group of 60 healthy control subjects who had been matched on demographic variables. When comparing the two groups they found that healthy AVH group did have lower global functioning scores (although still in the normal range) but that this was not predicted by the presence of AVH but by schizotypy, family level of psychiatric disorder and years of education. The healthy AVH group did not have clinically relevant symptoms (apart from hallucinations) but they did have elevated scores on non-clinical measures of schizotypy and delusions and increased rates of psychiatric disorder in their relatives. Sommer *et al.* interpreted these findings as suggesting that the non-clinical voice hearers may have a genetic predisposition to schizophrenia. They also had an increased environmental risk (they reported more trauma in

childhood) and so the authors concluded that their study showed that AVH are not isolated phenomena but part of a general vulnerability to schizophrenia.

In some respects, this demonstrates the point made earlier in this chapter that the underlying viewpoints of researchers bias their methodology and interpretation of findings. This study operated a quasi-dimensional approach, referring to AVH 'symptoms' and using psychiatric measures as the main source of information about the AVH. Despite finding that their participants had no other clinically relevant symptoms and exhibited normal levels of functioning, the authors concluded that voice-hearers are genetically vulnerable to schizophrenia because they scored higher on schizotypy measures and their relatives had higher rates of mental disorders than the non-AVH group. However, schizotypy can be viewed as neutral variation in personality rather than as attenuated schizophrenia and that the difference in the two groups' relatives' levels of mental disorders was significant only for affective disorders and not psychotic disorder.

The central question of this thesis concerns why some people experience AVH that are considered part of psychotic illness and require treatment and why others live in the community, without a psychiatric label or any need for treatment. As discussed above, current psychological models suggest that a range of cognitive, emotional, environmental and social factors will be important. The available literature comparing clinical and non-clinical AVH will now be reviewed, and discussed with respect to psychological models of psychosis.

Romme and Escher (1989) were the first researchers to write in depth about AVH existing outside of clinical disorder and to compare the experiences of non-clinical and clinical voice hearers. Their research was sparked when Romme and his patient appeared on Dutch television to discuss her problems with hearing voices and they appealed for people who experienced this problem to contact them. They were surprised when a third of the 450 respondents reported that they were able to cope with their voices, contrary to the received wisdom of the day that voices were destructive and meaningless symptoms of mental illness. They posted out questionnaires to these respondents and analysed the responses of the 173 returned questionnaires in terms of the ones who said that they could cope with their voices

and the ones who said that they could not. The people who could cope mostly experienced positive voices, although a sizeable proportion (39%) said their voices were mainly negative. Only around a third of copers found that their voices were disrupting their thoughts or contact with other people. They felt stronger in relation to their voices than non-copers and were less likely to follow their commands. The two groups had different ways of coping with disruptive voices, copers were more likely to use selective listening and to set limits with their voices whereas non-copers were more likely to try to distract themselves.

Rather than considering voices in isolation, the researchers were interested in what was happening in the person's life when they started hearing voices and they were interested in their current quality of life. The majority of respondents (70%) could pinpoint an event that had occurred before the onset of their voices, for 34% this was a traumatic event like an accident or death and for 36% it was other significant, but not necessarily traumatic events, like pregnancy or falling in love. In addition to perceived coping, the researchers were interested in whether there were differences between those who had been psychiatric patients and those who were not. It appeared that there were notable social differences between these two groups with the non-patients being more likely to be married (60% vs 39%), to have told other people about their voices (98% vs 86%) and to feel supported by others (98% vs 51%).

Despite showing that there were nontrivial numbers of the general public who heard voices that were mostly positive and did not require treatment, there have been only six more studies published comparing the experiences of clinical and non-clinical voice hearers in the two decades since Romme and Escher's seminal work and these will now be reviewed. Their findings have confirmed that the AVH of non-clinical voice-hearers are phenomenologically similar to clinical AVH but tend to be more positive and provoke less distress, two studies did not go beyond this simple comparison (Johns, Hemsley & Kuipers, 2002; Davies, Griffin & Vice, 2001). The remaining four have looked at the experience of AVH in greater depth by investigating pragmatic properties of voices or the beliefs that voice hearers hold about their voices (Leudar, Thomas, McNally & Glinski, 1997; Jones, Guy & Ormrod 2003; Andrew, Gray & Snowden, 2008). Two studies have examined the influence of trauma on AVH (Honig, Romme, Ensink, Escher *et al.*, 1998; Andrew *et al.*, 2008)

Johns et al. (2002) compared the auditory hallucinations of 14 patients with schizophrenia and 16 participants with tinnitus using the Mental Health Research Institute Unusual Perceptions Scale (MUPS; Carter, Mackinnon, Howard, Zeegers & Copolov, 1995). They found that the physical characteristics of the two groups' AVH were similar (e.g. volume, clarity and frequency) but that the schizophrenia group's voices were more negative whereas the tinnitus group were mainly positive. Both groups reported negative emotional responses to their auditory hallucinations and this distress was related not only to the hallucinations themselves (form and content), but to the participants' beliefs about their voices (that they would harm them) and their perceived lack of control. However, it is unclear how comparable the groups' experiences were as all the schizophrenia group heard voices while this was the case only for a quarter of the tinnitus group, the remainder experiencing musical hallucinations only. In addition to this, the study suffered from a number of methodological limitations including small sample size which precluded statistical analysis, and the fact that the two groups were extremely different in terms of demographic variables (e.g. mean age, sex, mean onset of voices).

Davies et al. (2001) conducted a simple study where they asked patients diagnosed with schizophrenia, evangelical Christians and 'normal' control subjects to rate how often they heard voices and their emotional responses to them. The patients' voices were more frequent, 78% reported hearing them 'all the time' compared to 59% of the evangelical Christians, none of the control group experienced such frequent voices. With regards to perceptions of voices and emotional responses to them, the evangelical Christians rated their voices as more positive than the control group who, in turn, rated them as more positive than the schizophrenia group. However, participants were selected for this study on the basis of answering affirmatively to one question on the Launay-Slade Hallucination Scale (Launay & Slade, 1981), namely whether they had ever heard a voice outside their head when no one was present. Without further information it is unclear whether they were all actually experiencing auditory hallucinations and whether their experiences were comparable. For example, it is possible that some non-patients had a one off experience of hearing their name called out loud, or experienced hypnopompic or hyppogogic hallucinations and these are not directly comparable to frequent, detailed, malevolent voices of patients.

In contrast to the two studies detailed above, Romme's research group compared the form and content of AVH in patients and non-patients in more detail, using psychiatric interviews (Honig et al., 1998). They recruited 18 patients diagnosed with schizophrenia, 15 patients diagnosed with dissociative disorder and 15 non-patients. All participants were asked about the characteristics of their AVH, history of their AVH and circumstances related to onset, present triggers, personal interpretation of the AVH, coping strategies and their life history. The authors were surprised that the form of voices in the three groups was similar, all heard voices both inside and outside the head and all heard voices speaking in the third person, although this was more common in the group with schizophrenia. What distinguished the groups was the content of voices and their responses to them. The non-patient group heard predominantly positive voices (93%) whereas the patient groups' voices were predominately negative (67%). The patients found their voices more frightening, more frequent, more disruptive and believed that they had less control over their voices. These findings add to the growing evidence that the difference between the voices of patients and non-patients lies not in the form of voices but in their content and the emotional and behavioural reactions to them.

Leudar et al. (1997) took a different approach by ignoring the physical characteristics of voices and examining their pragmatic properties, specifically how participants identify specific voices as individuals, how dialogue between the participants and their voices was arranged and how voices influence the participants' activities. They found the voices of patients (14 people diagnosed with schizophrenia) and nonpatients (13 undergraduates and 1 nurse) shared many pragmatic properties; they were focussed on the everyday activities of the participant and if more than one voice was present they rarely had access to each other. The features of the voices were similar to ordinary speech in that the content was rarely bizarre, was concerned with everyday activity, and the participants did not feel compelled to act as the voices asked. The authors state that differences in the groups existed not in the structure and function of voices but in the setting of parameters. The patients with schizophrenia experienced voices that sanctioned violence significantly more often and were less likely to consider what the voices said as having any worth and to more likely to ignore them. As with other studies that have compared these two groups, there were significant differences in demographic variables, namely that the group with schizophrenia had

significantly more male members and they were significantly older. However, these differences were taken into account during analysis of the data and do not appear to have had an undue effect.

Another group has examined the AVH of patients and non-patients using qualitative methods to examine interesting factors beyond voice characteristics. Jones et al. (2003) recruited 20 voice hearers (11 patients, 5 who had used mental health services in the past, but not necessarily for voices and 4 who had never sought help for their voices) and investigated their explanations of and beliefs about their voices using Qmethodology (Stephenson, 1935; 1953). This involved participants rating their agreement with 45 statements about voices (advocating biomedical, psychological and spiritual perspectives), this data was factor analysed to produce six factors to account for the differing views people had about voices (see Jones et al., 2003, for a detailed description of each perspective). This demonstrates that voice-hearers hold a wide range of perspectives on voices rather than there being a simple dichotomy between psychopathology and spirituality. The most commonly held perspective was that of the 'positive spiritual perspective'. The eight people who held this view believed that voices were positive experiences that were spiritual in nature and were critical of the biomedical approach. As found in previous studies, people who did not use mental health services were less likely to rate their voices as negative experiences compared to users of mental health services, although their experiences were not uniformly positive and some did find managing their voices difficult. The authors suggest that beliefs that a person has about their voices will determine their distress and helpseeking behaviour, particularly beliefs about individual's reactions to them. Honig et al. also found that 70% of respondents could trace the onset of their voices back to a traumatic event, although this was significantly more often the case for the patients (77% schizophrenia group, 100% dissociative group) compared to the non-patient (53%) group. The overall level of traumatic experience was high, with the majority of participants experiencing emotional neglect or physical or sexual abuse as children, only a minority hadn't suffered any abuse or neglect (17% schizophrenia group, 14% dissociative group and 27% of the non-patient group).

The most recent study comparing the AVH of patients and non-patients (Andrew *et al.*, 2008) has investigated the characteristics of voices in these two groups, finding

patients' voices were more frequent, less controllable, more negative and provoked more distress than non-patients' voices. Andrew et al. also investigated participants' beliefs about voices, and examined whether a history of trauma had influenced these The patient group believed their voices had more negative intentions beliefs. (malevolence) and had more power to carry out their negative intentions (omnipotence) compared to the non-patients. Unsurprisingly, they also had significantly higher levels of anxiety and depression. Experience of trauma was high across the sample; the majority of both groups had experienced trauma (>75%) but the psychiatric group had experienced a greater number of traumas in their lives and there was a significantly higher proportion of participants in that group who had experienced childhood sexual abuse. Multiple regression analyses revealed that the best predictor of distress (general anxiety or depression) was beliefs about voices (particularly malevolence) and that the best predictor of beliefs about voices was trauma, specifically post-traumatic symptomatology. The authors interpret their findings as suggesting that trauma could act as a vulnerability factor for developing AVH but that the nature of the trauma and the extent to which it is resolved may represent a maintaining factor by influencing the individual's beliefs about their voices. The results should be interpreted with caution as the groups were not well matched (the clinical group were significantly younger and contained significantly more males) and the non-patients were not screened for mental health problems. Andrew et al. also acknowledge that there are doubts as to whether their non-clinical sample would be representative of the broader population of voice hearers as they whether hearing voices is normal. They described how some spiritualist voice-hearers believed their difficult voices reflected the character of the person in spirit, and although these voices were distressing they were able to cope without seeking mental health support.

Romme and Escher (1989) had found that significant events often preceded the onset of voices in their participants and so Honig *et al.* (1998) also asked about their patients' life histories. They found that the non-patients were significantly more likely to start hearing voices in primary school. Whilst they did not offer any interpretation of this finding, it could be hypothesised that the onset of voices in childhood (as opposed to in adulthood) may affect the content of voices or the were mostly spiritualist mediums and not all non-patient voice hearers view their voices in these terms (Jones *et al.*, 2003).

Thus overall the results of studies comparing clinical and non-clinical voice hearers support the suggestions of cognitive models. The characteristics of voices are similar in form but they appear to have more negative content and provoke more distress. There is evidence that non-clinical voice-hearers make different appraisals of their AVH and that such appraisals may be influenced by early adversity (Andrew *et al.*, 2008). There is some indication that there are differences between the two groups in terms of social factors (Romme & Escher, 1989) but these need to be investigated more fully. Qualitative methodologies have been shown to be useful, both in their ability to tap experiences from the participants' point of view (Jones *et al.*, 2003) and to measure qualities of voices that are not covered by psychiatric questionnaires (Leudar *et al.*, 1997). However, there are methodological problems common to them all, including small sample sizes and inadequate matching of groups. Furthermore, although a biomedical perspective would suggest that there may be neurobiological differences in clinical and non-clinical AVH, these factors have not been studied.

1.6 The aetiology of AVH: inner speech and source monitoring deficits

Whilst the causes of AVH have not yet been explained definitively, the consensus of many researchers is that voices are experienced when inner speech is misattributed to an alien source (Hoffman, 1986; Bentall, 1990; Frith, 1992). This hypothesis would appear to have face validity as, like inner speech, AVH generally concern the everyday activities of the voice-hearer; commenting on people and events and issuing instructions (Leudar, Thomas, McNally & Glinski, 1997). There is good physiological evidence for the involvement of inner speech in AVH, using different techniques, dating back over 60 years. Gould (1948) used electromyography to demonstrate that subvocalisation is increased in those who are hallucinating. Later studies have recorded subvocalisation, establishing that it coincides with the onset of AVH, and amplified the recordings to listen to what appears to be the participants' AVH (Gould, 1948, 1949, 1950; Green & Preston, 1981; Inouye & Shimizu, 1970). More recently, research using neuroimaging has supported the inner speech hypothesis by demonstrating that brain regions involved in speech, particularly Broca's area, are active during AVH (Dierks, Linden, Jandl, Formisano et al., 1999; Shergill, Brammer, Williams, Murray *et al.*, 2000). However, research findings do not unanimously support an inner speech account of AVH. Gould (1948) found that some AVH were not accompanied by subvocalisation and not all neuroimaging studies report Broca's area activation during AVH (Lennox, Park, Jones & Morris, 1999; Lennox, Park, Medley, Morris & Jones, 2000; Ait Bentaleb, Beauregard, Liddle & Stip, 2002; Sommer, Diederen, Blom, Willems *et al.*, 2008).

There are a number of theories proposing mechanisms for the misattribution of inner speech to alien sources (e.g. Hoffman, 1986; Frith, 1987; Morrison, Haddock & Tarrier, 1995) but only one of the most prominent theories, Bentall's (1990) cognitive model of hallucinations, will be considered here. Influenced by work on reality monitoring in non-clinical subjects (Johnson, Hashtroudi & Lindsay, 1993), Bentall proposed that voice-hearers have an impairment in the ability to distinguish between real and imaginary events. He argued that voice-hearers have a bias towards attributing their thoughts to an external source; an impairment in a skill called source-monitoring. Describing AVH as errors of judgement rather than perception is advantageous in that it can explain the effect of contextual factors like stress, sensory deprivation and culture on AVH.

Signal detection theory (SDT; Green & Swetts, 1966) provided an excellent method for Bentall and others to empirically test the source monitoring hypothesis. SDT is a method of testing how perceptual judgements are made under conditions of uncertainty. It proposes that an individual's ability to detect a stimulus is based on two factors; the efficiency of their perceptual system (perceptual sensitivity) and their willingness to assume a stimulus is present (perceptual bias). Perceptual sensitivity is a fairly stable factor, whilst perceptual bias is more fluid and can be influenced by beliefs and expectations. Signal detection experiments involve asking participants to detect stimuli (such as a voice) in periods of white noise, where the stimuli is randomly presented on half of the trials. Four types of judgements can be made; those classified as 'hits' (correctly identifying the stimulus), 'misses' (failure to identify the stimulus), correct rejections (correctly judging the stimulus to be absent) and 'false alarms' (incorrectly judging the stimulus to be present). False alarms are the experimental equivalent of hallucinations. The scores can be analysed to provide a measurement of each participant's perceptual sensitivity and bias, respectively. Bentall and Slade (1985a) conducted signal detection experiments with both clinical (hallucinating and non-hallucinating participants diagnosed with schizophrenia) and non-clinical participants (students rated as having high or low predisposition to hallucinations). Both experiments confirmed that hallucinators and non-hallucinators (whether clinical or non-clinical) do not differ on measures of perceptual sensitivity but the hallucinators do have a strong bias towards detecting signals, thereby supporting the source-monitoring hypothesis. These findings were later replicated by Rankin and O'Carroll (1995). Other research groups have also supported the sourcemonitoring hypothesis using different methodologies, e.g. Johns & McGuire (1999) asked participants to record their own speech and then played it back to them after it had been distorted; hallucinating patients were significantly more likely than nonhallucinating patients and non-clinical controls to perceive that their own speech came from another person. In addition, numerous studies have used a different methodology, requiring participants to self-generate stimuli (using word association and generation tasks) and, after a delay, asking them to judge whether re-presented stimuli were generated by themselves or others (e.g. Heilbrun, 1980; Bentall, Baker & Havers, 1991; Morrison & Haddock, 1997; Brebion, Amador, David, Malaspina et al., 2000; Laroi, van der Linden & Marczewski, 2004). These have supported the hypothesis that hallucinators and hallucination-prone participants are biased towards attributing stimuli to an external source and that such errors are influenced by inadequate use of cognitive effort cues and emotionally laden stimuli.

1.7 Outline of the current thesis

Overall aim and theoretical underpinnings

The current thesis endeavours to explore the phenomenology of clinical and nonclinical AVH and the factors involved in determining distress and need for care. Previous research and theory reviewed within this chapter suggests that the topography of AVH in the two groups will not differ significantly but that they will be differentiated by the content of, and the distress associated with, their voices. Cognitive models suggest that voice-related distress will be predicted by cognitive factors such as appraisals of voices and metacognitive beliefs. It is suggested that these cognitive factors arise from environmental history and thus it is predicted that clinical voice-hearers will have experienced more adverse experiences in childhood. Research on the influence of cognitive and environmental factors on these two groups will be reviewed in greater detail in the following three chapters. Psychological models of psychosis suggest that social and neurobiological factors will also be important but to date these have not been compared specifically in clinical and non-clinical voice hearers, thus this will be an unique feature of this thesis.

Methodology

The current thesis aims to expand upon previous studies in several ways:

- 1. *Sampling:* by recruiting non-clinical voice-hearers with a range of explanatory beliefs about voices, not just spiritual beliefs. It will also aim to have better matched samples as many of the previous studies have had differences on demographic variables such as sex, age, etc. However, it is important to acknowledge that it will be challenging to recruit participants for this project and it may be difficult to select two groups that are well matched.
- 2. *Methodology*: the current thesis will aim to extend previous studies by employing quantitative and qualitative psychological methods as well as neurobiological investigative methods. It will be recognised that no single methodology has priority but each complement one another and will enrich the search for factors that contribute to the differential outcome of AVH.
 - a) Quantitative methods Study 1 will replicate the work of Andrew *et al.* (2008) in examining whether voice-related distress is predicted by beliefs about voices which are, in turn, predicted by trauma history. The current study will extend this work to consider whether attachment history similarly influences beliefs about voices and thus distress.
 - b) Qualitative methods Study 2 will employ a qualitative methodology to allow a more open approach and to understand the personal meaning of AVH in an individual's narrative.
 - c) Neurobiological methods Study 3 will represent the first fMRI study of nonclinical AVH. Comparing the two groups' voices in this way may elucidate whether they are induced by the same process.

Chapter layout

The thesis will be organised into the following subsections and chapters:

Literature Review

- Chapter 1: Exploring the psychosis continuum
- Chapter 2: Cognitive factors in AVH
- Chapter 3: Environmental factors in AVH a) Attachment
- Chapter 4: Environmental factors in AVH b) Trauma

Methods

- Chapter 5: Methods

Results

Psychological and Social Factors in AVH

- Chapter 6: Study 1 Quantitative Data Analysis
- Chapter 7: Study 2 Qualitative Data Analysis

Neurobiological Factors in AVH

- Chapter 8: Study 3 – fMRI Data Analysis

Discussion

- Chapter 9: General discussion
Chapter 2: Cognitive Factors in AVH: Beliefs about Voices and Beliefs about Thinking

Chapter 1 introduced the notion that AVH are not necessarily indicative of mental health disorder and are experienced by non-trivial numbers of people in the general population with no need for treatment. Recent cognitive models of psychosis were reviewed which suggest that it is the interpretation of, rather than the mere occurrence of, AVH that can lead to clinical outcomes. Garety *et al.* (2001; 2007) have argued that the appraisal of AVH as externally caused and personally significant is key to developing psychotic symptoms, while Morrison (2001) has suggested that AVH are judged psychotic when the appraisals made of them are culturally unacceptable. Both models hypothesise that appraisals are influenced by past experience. Morrison has also argued that holding certain beliefs about thinking (metacognitive beliefs) make external appraisals of intrusive thoughts more likely. The current chapter reviews the literature on such cognitive factors in AVH (appraisals and metacognitive beliefs), focusing on differences between clinical and non-clinical AVH, before concluding with consequent hypotheses for the current study.

2.1 Appraisals of anomalous experiences

Garety *et al.*'s model (2001, 2007) suggests a central role for appraisals in the development of clinical psychotic disorder. They posit that anomalous experiences become psychotic symptoms when appraised externally and as personally significant. Evidence that those who hear voices have an externalising bias comes from experimental studies of source monitoring where hallucinating patients diagnosed with schizophrenia have been shown to be less likely than non-hallucinating control participants to rate the words they generated in a word association task as internally created, especially with emotionally salient words (Morrison & Haddock, 1997; Baker & Morrison, 1998) and to misattribute their own speech as belonging to other people when it is played back to them in a distorted manner (Johns, Rossell, Frith, Ahmad *et al.*, 2001).

Recently Brett, Peters, Johns, Tabraham *et al.* (2007) have compared the appraisals made by people who experience anomalous experiences (including AVH), both with and without a diagnosis. Brett *et al.* (2007) developed the Appraisals of Anomalous

Experiences Interview (AANEX) for this purpose and administered it with three groups of people who had experience of anomalous experiences; a group diagnosed with psychosis, a help-seeking group who were considered to be at risk of developing psychosis and an undiagnosed group with no need for care. The first section of the AANEX records the lifetime and current presence of 40 different types of anomalous experiences including Schneiderian first rank symptoms (e.g. AVH, thought transmission, thought withdrawal etc.), paranormal experiences (e.g. out of body experiences) and other associated perceptual, cognitive and affective anomalies (e.g. somatic anomalies, time distortion, loss of emotions). The context in which these anomalous experiences arose is also noted. The second section of the AANEX contains a detailed examination of the appraisals that individuals make of their anomalous experiences including eight different categories of causal appraisals (biological, psychological, drug-related, spiritual, supernatural, normalising, other people or no interpretation) and four different categories of dimensions of appraisals (valence, dangerousness, externality and agency). The context of the appraisal is noted as well as consequences of appraisals such as emotional and behavioural responses to the anomalous experiences and implications of making such appraisals for beliefs about anomalous experiences in other people and beliefs about the self and the world.

Brett *et al.* (2007) found that the undiagnosed group were significantly less distressed by their experiences than the two clinical groups, and they also made more positive appraisals of their experiences and felt that they were less dangerous. Although the undiagnosed group were more likely than the clinical groups to appraise their experiences as being caused by an impersonal cause rather than some agency, there were no significant differences between the groups in terms of appraisals of externality. Thus, this finding contradicts the hypothesis of Garety *et al.* (2001) that the appraisal of externality is key to the development of psychosis. There is some evidence that the diagnosed group were more likely to make culturally unacceptable appraisals of their experiences as they were significantly more likely than the undiagnosed group to say that their anomalous experiences were caused by other people and less likely to make 'psychological' or 'normalising' appraisals. They were also significantly less likely to report feeling that there was social understanding of their experiences.

Appraisals of AVH

As yet, no study has specifically examined appraisals of AVH with reference to externality or cultural unacceptability. There is, however, a body of work on voice-hearers' beliefs about their voices' intentions and power. Chadwick and Birchwood (1994) developed a cognitive model where such beliefs about voices are posited as crucial to determining distress.

Chadwick and Birchwood (1994) interviewed 26 people diagnosed with schizophrenia and found that the entire group believed that their voices were omnipotent and they could be divided into those who believed that their voices had either malevolent or benevolent intent. The participants' reactions to their voices followed neatly on from their beliefs about intent; malevolent voices were resisted and benevolent voices were engaged with. Interestingly, the findings showed that beliefs about voices were constructed by the individuals and did not always follow on directly from voice content. In fact, in 31% of cases the beliefs were at odds with the content of the voices, for example, one voice was appraised as benevolent even though it urged the voice-hearer to kill his daughter.

However, an independent replication of this study failed to corroborate this interesting finding. Close and Garety (1998) reported that none of their participants had beliefs that were at odds with the content of their voices; those with positive content were judged benevolent and those with negative content were judged malevolent. They also failed to find neat associations between participants' beliefs about their voices and their consequent reactions to voices. Although Chadwick and Birchwood (1994) found that malevolent voices were always resisted, this was the case for only 77% of Close & Garety's sample. Similarly, the first study reported that benevolent voices were always engaged with but Close & Garety found this was the case in only 63% of their sample. Similarly, while they found all malevolent voices were associated with a negative emotional response, benevolent voices were met with a positive emotional response in only 13% of cases. Thus it appears beliefs about voices alone were not sufficient to determine affective responses in this sample. Close and Garety (1998) suggested that self-appraisals may be important, finding that the majority of voicehearers who reacted negatively to their voices had low self-esteem (76%) and negative self-appraisals (82%). Thus they suggested there may be a reciprocal

relationship whereby voices activate negative core beliefs about the self which provoke negative affective and behavioural responses, in turn strengthening the core beliefs about the self.

The previous two studies used the Assessment of Voices Schedule (Chadwick & Birchwood, 1994) to measure cognitive and behavioural responses to voices but more recent studies have used the Beliefs about Voices Questionnaire (BAVQ; Chadwick & Birchwood, 1995) and its shorter revision the BAVQ-R (Chadwick, Lees & Birchwood, 2000). Using the BAVQ, Birchwood and Chadwick (1997) re-tested their model in 62 voice-hearers diagnosed with schizophrenia. They confirmed their previous findings that affective and behavioural reactions to voices were associated with beliefs about voices rather than topography (frequency, loudness, clarity) or content. They also replicated their finding that beliefs about voices are not always directly associated with their content as beliefs only followed directly on from content in only 24% of cases. A number of studies have since demonstrated that distress and behavioural reactions to voices are related to beliefs about voices (Soppitt & Birchwood, 1997; Sayer, Ritter & Gournay, 2000; van der Gaag, Hageman & Birchwood, 2003).

Birchwood and Chadwick (1997) speculated that beliefs about voices are influenced by cognitive schemata. Cognitive schemata are assumed to be autobiographical in nature, stemming from the individual's experience of interpersonal relationships, especially those with primary care givers. Birchwood and his colleagues indirectly tested this speculation in a study which examined whether an individual's relationship with their voice(s) is mirrored by their social relationships (Birchwood, Meaden, Trower, Gilbert & Plaistow, 2000). There was a close association between the voicehearers' perceptions of power and rank differences between themselves and their voices and themselves and the outside social world. Participants who believed their voices were more powerful than themselves were more depressed and also saw themselves as subordinate to others in their social world. Participants who believed they were lower in social rank to their voices felt more distressed by their voices and also felt they were lower in social rank compared to others in their social world. These findings were replicated in a later study (Birchwood, Gilbert, Gilbert, Trower *et al.*, 2004). Birchwood *et al.* (2004) argue that the relationship between a voice-hearer and their voice is partly shaped by interpersonal schemata that guide social interaction. They suggest that a person who has experienced early adversity (e.g. trauma or attachment problems, see Birchwood, 2003) could develop interpersonal schemata that posits other people as dominant and threatening and the self as subordinate and vulnerable. This can make the individual vigilant and wary in relationships, whether these are with people in the social world or with their voices.

Only one study has directly compared beliefs about voices in clinical and non-clinical voice hearers (Andrew *et al.*, 2008). Their results supported the suggestions of the Chadwick and Birchwood model, demonstrating that non-clinical voice hearers rated their AVH as significantly less malevolent and omnipotent, and significantly more benevolent than clinical voice-hearers. They also engaged with their voices more, and resisted them less. Andrew *et al.* also reported that the best predictor of distress was beliefs about voices, which were themselves best predicted by trauma variables, supporting Birchwood et al's (2004) assertion that beliefs about voices are influenced by past experiences. However, no study has yet been published that has demonstrated that voice-hearers' beliefs about their voices are determined by interpersonal schema, which have been influenced by early experiences like trauma.

Andrew *et al.* are the only researchers to have investigated differences in appraisals of AVH in clinical and non-clinical groups. They also compared the characteristics of these voices using the PSYRATS auditory hallucination subscale which has one item on beliefs about the source of voices. Although the data on this one item was not published, they found that the entire non-clinical group rated their voices as being external, spiritual entities whereas only a third of the clinical group believed that their voices originated from external sources (Andrew, personal communication). This supports Brett *et al.*'s (2007) finding that external appraisals of psychotic experiences are not more common in clinical groups, as would be suggested by Garety *et al.* (2001, 2007).

2.2 Metacognitive beliefs and AVH

Another cognitive phenomena implicated in the development of AVH are metacognitive beliefs (Morrison, 2001; Bentall & Fernyhough, 2008). Metacognition is defined as an individual's knowledge of and beliefs about their own cognitive

system, put simply it is 'thinking about thinking' (Flavell, 1979). Wells and Matthews (1994) first speculated about the role of metacognitive beliefs in psychological disorders in their Self-Regulatory Executive Function (S-REF) model of emotional disorder. According to this model, metacognitive beliefs can contribute to vulnerability to and maintenance of psychological disorder by driving maladaptive cognitive and attentional mechanisms such as ruminative processing, heightened self-focused attention and threat monitoring.

Most studies of metacognitive beliefs employ the Metacognitions Questionnaire (MCQ; Cartwright-Hatton and Wells, 1997) which is a 65 item scale that consists of five subscales: 1) 'Positive beliefs about worry', which measures the extent to which an individual positively values worry and believes it is useful; 2) 'Negative beliefs about worry concerning uncontrollability and danger', which measures the extent to which an individual believes their worrying is uncontrollable and dangerous; 3) 'Lack of cognitive confidence', which measures the extent of the individual's confidence in their attention and memory processes; 4) 'Negative beliefs about thoughts concerning the need for control' which measures the extent to which an individual believes certain thoughts should be controlled and 5) 'Cognitive self-consciousness' which measures the individual's awareness and monitoring of their thoughts. A more economical 30 item measure has since been developed (MCQ-30; Wells & Cartwright-Hatton, 2004).

Support for the link between metacognitions as measured by the MCQ and MCQ-30 and psychological dysfunction has been found in a range of affective disorders including depression (Papageorgiou & Wells, 2001), pathological worry (Wells & Papageorgiou, 1998), generalised anxiety disorder (Wells & Carter, 2001), and post-traumatic stress symptoms (Roussis & Wells, 2006). Although the S-REF was developed to account for the development and maintenance of affective disorders, researchers have now begun to look for associations between metacognitive beliefs and psychosis.

Metacognitive beliefs and AVH

Cognitive models of psychosis (Morrison *et al.*, 1995; Morrison, 2001; Bentall & Fernyhough, 2008) suggest that auditory hallucinations are experienced when

intrusive thoughts are mistakenly attributed to external sources. They argue that when an individual's metacognitive beliefs are at odds with the presence of intrusive thoughts it causes cognitive dissonance (an uncomfortable state of holding contradictory cognitions; Festinger, 1957) which is resolved by attributing the intrusive thoughts to an external source. Thus, for example, if an individual frequently experiences intrusive thoughts but also believes that thoughts should be controlled and certain thoughts can be dangerous, an aversive state of cognitive dissonance arises which can be resolved by attributing the intrusions to an external source. Metacognitive beliefs that thoughts are uncontrollable and dangerous can also lead to dysfunctional attempts to regulate mental activity such as thought suppression, which results in the occurrence of more intrusions (Jones & Fernyhough, 2006).

There is evidence that voice-hearers diagnosed with psychiatric disorder have more intrusive thoughts, that they rate as more uncontrollable, unacceptable and more distressing than psychiatric and non-psychiatric control groups (Morrison & Baker, 2000). They also have higher scores on the MCO than control groups. Baker and Morrison (1998) have shown their voice-hearing group scored higher on both 'positive beliefs about worry' and 'negative beliefs about worry' than two non-voice hearing control groups, which they interpreted as evidence that conflicting metacognitive beliefs can give rise to AVH. They found that the most significant predictor of whether an individual was an hallucinator was 'Negative beliefs about worry' suggesting that the more an individual believes that worries are uncontrollable or dangerous, the more likely they are to hallucinate i.e. attribute their worries to external sources. Garcia-Montes, Perez-Alvarez, Balbuena, Garcelan and Cangas (2006) found that hallucinating schizophrenia patients scored higher than non-patients on two negative subscales of the MCQ: 'Negative beliefs about worry' and 'Negative beliefs about thoughts, concerning the need for control' but they did not find that they scored higher on positive beliefs. The most significant predictor of predisposition to hallucinations was 'Negative beliefs about thoughts, concerning the need for control' which suggests that the more an individual believes they should be able to control their thoughts, the more likely they are to hallucinate. The authors interpret this as supporting Morrison et al's (1995) model which suggests AVH result from the cognitive dissonance caused by the coexistence of intrusive thoughts and metacognitive beliefs about the need to control thoughts.

A number of studies have compared the MCQ scores of non-clinical participants who have been divided into hallucination-prone and non-hallucination prone groups based on their scores on the Launay Slade Hallucination Scale (LSHS; Launay and Slade, 1981). Some have suggested that both positive and negative metacognitive beliefs are involved in hallucination proneness whereas others have found only significant associations between hallucination proneness and negative metacognitive beliefs. Morrison, Wells and Northard (2000) found that their hallucination-prone group scored significantly higher than the non-hallucination prone group on three subscales: 'Negative beliefs about worry', 'Negative beliefs about thoughts, concerning the need for control' and 'Cognitive self-consciousness'. Unlike Baker and Morrison (1998) they did not find that the hallucination-prone group scored higher on the 'Positive beliefs about worry' subscale but they did score higher on a separate scale item measuring positive beliefs about unusual experiences, which they interpret as supporting their theory that cognitive dissonance is involved in producing hallucinations. Two other groups have reported that hallucination-prone groups have higher scores on all the subscales of the MCQ (Laroi & van der Linden, 2005) and MCQ-30 (Jones & Fernyhough, 2006) thus supporting the theory that both positive and negative metacognitions are involved in hallucinations. However one study has found that the only significant correlations between auditory hallucination predisposition and MCQ scales were for negative metacognitive beliefs (Cangas, Errasti, Garcia-Montes, Alvarez et al., 2006). In this study the only significant predictor of auditory hallucination proneness was 'Negative beliefs about thoughts, concerning uncontrollability and danger'. Stirling, Barkus and Lewis (2007) also found that hallucination proneness scores positively correlated with every MCQ subscale except for 'Positive beliefs about Worry'.

So far there is disagreement whether positive and negative metacognitive beliefs are needed together to produce hallucinations or whether negative metacognitive beliefs alone are sufficient. More relevant to the focus of this thesis, it is not clear whether metacognitive beliefs are implicated in the genesis of hallucinations only or whether they are important in determining the distress associated with them. The S-REF model suggests that specific metacognitive beliefs are a risk factor for general psychopathology and this is supported by studies that have failed to find significant differences in MCQ scores between hallucinators and those with OCD (GarciaMontes *et al.*, 2006) and between groups diagnosed with schizophrenia and anxiety disorders (Lobban Haddock, Kinderman & Wells, 2002; Morrison & Wells, 2003). Garety *et al.* (2001, 2007) report findings that metacognitive processes such as excessive rumination are linked with more severe distress associated with delusions, but such links have not been investigated in AVH.

Recently Brett, Johns, Peters and McGuire (2009) have investigated whether metacognitive beliefs are associated with the occurrence of anomalous experiences (including first rank symptoms like AVH) or with the distress associated with them. They measured metacognitive beliefs, general psychological distress, the existence of anomalous experiences and distress associated with such experiences in two clinical groups (psychotic patients and patients with 'at risk mental states') and two nonclinical groups (undiagnosed people with anomalous experiences and a control group). They found that the two clinical groups had higher MCQ scores than the nonclinical groups and any group differences disappeared after controlling for anxiety and, to an extent, depression. This suggests that metacognitive beliefs are associated with emotional disorder rather than anomalous experiences. They also failed to find any significant associations between MCQ subscales and first rank symptoms but found that 'Negative beliefs about thoughts concerning the need for control' significantly predicted the distress associated with anomalous experiences. It must be noted that this was only a small OR of 1.1, which indicates that an increase in negative beliefs about the need to control thoughts is associated with a small increase in distress. These findings suggest that metacognitive beliefs are associated with distress related to psychotic experiences rather than the occurrence of psychotic experiences themselves.

2.3 Conclusions and hypotheses

This chapter has reviewed the evidence on the influence of cognitive factors in the development of a need for care in psychotic experiences. It is argued that ongoing appraisals of experiences, as well as existing beliefs about cognitions, influence the outcome of anomalous experiences.

One study has been published which has investigated appraisals in clinical and nonclinical voice hearers, focusing on their beliefs about voices' power and intentions (Andrew *et al.*, 2008). It is likely that other kinds of appraisals such as appraisals of causation may differentiate these two groups, as they do groups with varied anomalous experiences, including AVH (Brett *et al.*, 2007). No study has yet compared appraisals (besides using the BAVQ) of voices in clinical and non-clinical groups and this will be one aim of the present thesis. The only comprehensive measure of appraisals of psychotic experiences (AANEX; Brett *et al.*, 2007) was published after data collection had begun in this thesis and so psychometric measurement of appraisals in the current thesis will be limited to beliefs about voices' power and intent (measured by BAVQ-R) and whether voices are deemed to originate from internal or external sources (item 5 of the PSYRATS-auditory hallucination subscale). Appraisals will be explored in richer detail in the qualitative analysis study of this thesis, which will allow participants to discuss their AVH and appraisals in their own words and could possibly reveal important appraisals that are not tapped by the psychometric measures.

Also considered in this chapter, metacognitive beliefs have been extensively studied with regard to their involvement in the production of AVH but there has been less research examining their role in the distress associated with AVH. It is not clear how metacognitive beliefs may be important in the distinction between clinical and nonclinical voice hearers and so the MCQ-30 will be used to explore this question. This will be the first study to measure metacognitive beliefs in non-clinical voice-hearers.

Following this review of the literature, the following hypotheses can be proposed about cognitive factors in clinical and non-clinical AVH.

- There will not be significant differences between clinical and non-clinical voice-hearers in terms of whether they appraise their voices as originating from internal or external sources.
- 2. The clinical group will appraise their voices as more malevolent and omnipotent, and less benevolent, than the non-clinical group.
- The clinical group will have higher scores on the MCQ-30 than the nonclinical group.

Chapter 3: Environmental Factors in AVH: a) Attachment

The previous chapters have reviewed the development and maintenance of AVH according to recent cognitive models. These models posit that AVH are not necessarily distressing or clinically relevant unless they are appraised in certain ways, for example, as personally significant and externally caused (Garety *et al.*, 2001; 2007), as powerful with malevolent intentions (Chadwick & Birchwood, 1994) or if they are interpreted in a culturally unacceptable manner (Morrison, 2001). Such models suggest that AVH are more likely to develop in those who have experienced adversity and that negative interpretations of AVH are more likely to be made by those who have had early adverse experiences of other people. Cognitive models propose that early adverse experiences of other people lead to the development of negative interpretations soft at that influence perceptions of self and others in the social world, as well as voices. Similarly, attachment theory describes how early experiences with caregivers mould internal working models of self and others which later influence adult mental health and thus this chapter considers how attachment may be relevant to the distinction between clinical and non-clinical AVH.

3.1 Attachment theory

Attachment theory was developed by Bowlby (1969,1973,1980) to explain the distress displayed by infants on separation from their caregivers. He hypothesised that infants develop a strong bond or 'attachment' to their primary caregiver which leads them to seek proximity to this attachment figure and to become distressed when involuntarily separated from them. Bowlby suggested that an 'attachment behavioural system' had evolved to maintain proximity to caregivers and hence provide protection for the helpless infant. Following involuntary separation, the infant exhibits 'attachment behaviours' such as visually searching, crying etc, that serve to re-establish proximity and protection.

Ainsworth, Blehar, Waters and Wall (1978) empirically investigated attachment behaviours in the 'Strange Situation' paradigm, where infants of 12-18months old were systematically separated and reunited with their parent and their behaviours were observed. The majority (around 60%) of children were distressed on separation from their parent but were easily soothed on reunion, these children were labelled 'secure'. The remaining children were labelled 'insecure' and there appeared to be two types of attachment insecurity: half of the insecure children were extremely distressed by the separation and were difficult to soothe (labelled 'anxious-ambivalent') and the other half of the insecure children were seemingly undisturbed by the separation and even avoided the parent upon reunion (labelled 'avoidant'). Years later, a third insecure category was added: 'disorganised' (Main & Solomon, 1990). These children were initially thought unclassifiable because of their contradictory behaviours (e.g. seeking the parent but then avoiding them), odd movements, freezing, fear and disorientation.

Bowlby (1973) argued that these attachment experiences become internalised and carried forward into adulthood as 'internal working models' of self and relationships with other people. These IWMs can be positive or negative depending on the individual's early attachment experiences. The child who experiences loving and responsive care will develop a model of the self as loved and a model of others as loving. In contrast, a child who experiences rejecting or undependable caregiving will develop a model of the self as unlovable or rejected and a model of others as unloving and rejecting (Dozier, Stovall & Albus, 1999).

Measuring Attachment

There are two main paradigms in adult attachment research, both concur that IWMs develop from early interpersonal experiences but they have differing views on how they can be measured. The first paradigm involves using the Adult Attachment Interview (Main, Kaplan & Cassidy, 1985; George, Kaplan & Main, 1985; Main & Goldwyn, 1988), which requires the respondent to recall their relationship with their parents when they were a child. This approach measures 'attachment states of mind' based on the coherence of the individual's narrative. Respondents are classified as secure, preoccupied (anxious-ambivalent), dismissing (avoidant) or unresolved (disorganised). The AAI provides rich data on the respondents' attachment history but is time consuming to administer and requires that the interviewer has specialist training in its use.

The second paradigm uses self-report measures to tap attachment in adult relationships, derived from Hazan & Shaver's (1987) work that reasoned romantic love is a form of attachment relationship. Respondents are classified in three categories that correspond to Ainsworth's infant attachment classification: secure, avoidant or anxious-ambivalent. Bartholomew (1990) noted that Main et al.'s and Hazan and Shaver's two classification systems were not compatible, particularly between their scales that measure attachment avoidance. She argued that 'dismissing' attachment (from Main's AAI measure) and 'avoidant' attachment (from the Hazan & Shaver measure) represented two different types of avoidance - the former is motivated by self-reliance whilst the latter is motivated by the fear of rejection. Bartholomew addressed this by proposing a new four-category model, incorporating parts of each classification system: secure, preoccupied (ambivalent), dismissing (avoidant) or fearful (disorganised), this is illustrated in Figure 3.1. Bartholomew and Shaver (1998) demonstrated that individuals classified using Main's AAI and Hazan & Shaver's measure are very closely categorised in the corresponding categories of Bartholomew's (1990) four-category model, providing evidence for the validity of the new model.

Traditionally, attachment was measured categorically but it is now agreed that selfreport measures are better conceptualised dimensionally (e.g. Crowell, Fraley & Shaver, 1999; Brennan, Clark & Shaver, 1998; Kurdek, 2002). Factor analyses of self report data have revealed that there are two underlying dimensions which can be conceptualised either in cognitive terms (Bowlby's IWMs; model of self vs model of others) or in affective-behavioural terms (attachment anxiety vs attachment avoidance). Attachment anxiety measures an individual's self worth (corresponds to 'model of self') and attachment avoidance measures an individual's desire for intimacy with other people (corresponds to 'model of others'). A prototype secure individual would have low scores on both of these dimensions. Perhaps as Berry *et al.* (2007) suggest, the 'fearful' attachment prototype is the one most vulnerable to developing psychopathology being as it is characterised by both a low opinion of the self and of relationships with other people. Figure 3.1 illustrates how attachment dimensions and categories can be conceptualised.

MODEL OF SELF (ANXIETY)

	POSITIVE (LOW)	NEGATIVE (HIGH)
	SECURE	PREOCCUPIED
POSITIVE (LOW)	Positive view of self and others Comfortable with intimacy and	Self worth based on approval of others
MODEL OF OTHERS	autonomy	(Main's preoccupied category) (Hazan & Shaver's anxious-ambivalent category)
(AVOIDANCE)	DISMISSING	FEARFUL
NEGATIVE (HIGH)	Positive view of self but dismissive of intimacy	Negative view of self and others Fearful of intimacy and socially avoidant
	(Main's dismissive category)	(Main's unresolved category) (Hazan & Shaver's avoidant category)

Figure 3.1 Diagram illustrating how attachment categories and dimensions can be conceptualised, adapted from Bartholomew and Horowitz (1991), p227.

3.2 Attachment and psychosis

Bowlby believed that attachment was important across the lifespan and in determining adult mental health, stating "variations in the way these bonds develop and become organised during the infancy and childhood of different individuals are major determinants of whether a person grows up mentally healthy or not". (1988, p.162). Thus early attachment experiences with caregivers influence adult mental health through their effects on IWMs of self and others. Relationships between insecure adult attachment styles and different types of mental health problems has been empirically supported, particularly with depression (e.g. Hazan & Shaver, 1987; Carnelly, Pietromonaco & Jaffe, 1994), anxiety (Hazan & Shaver, 1990; Mikulincer, Florian & Weller, 1993) and low self-esteem (e.g. Collins & Read, 1990; Brennan & Morris, 1997).

Though well researched in emotional disorders, there are fewer studies of associations between attachment and psychotic disorders. A small number of studies have indicated that people diagnosed with schizophrenia have higher levels of insecure attachment compared to people judged psychologically healthy. Dozier and colleagues have completed a number of studies comparing the attachment styles of psychiatric patients and non-psychiatric control groups using the AAI. They found that individuals diagnosed with psychiatric disorders were more insecure than those who did not have psychiatric problems (Dozier, 1990; Dozier, Stevenson, Lee & Velligan, 1991) and that a group of people diagnosed with schizophrenia had higher levels of insecurity (avoidant) than a group of people diagnosed with affective disorder (Dozier *et al.*, 1991).

Tyrell & Dozier (1997) used a new classification system for the AAI (Main & Goldwyn, in press) to investigate the attachment status of 42 people with psychiatric diagnoses (27 diagnosed with schizophrenia). Using the three category system (autonomous, preoccupied and dismissing), 89% of the schizophrenia group were classified as dismissing. However, when the original four category system was employed (which includes unresolved), 44% were classified as unresolved. Dozier, Stovall and Albus (1999) warn that these findings should be interpreted with caution as participants diagnosed with schizophrenia may be rated as 'unresolved' due to the confounding presence of thought disorder which involves the "lapses in monitoring of reasoning and discourse" (Main & Goldwyn, cited in Dozier *et al.*, 1999) that is used to define unresolved status. They also warn that it is unlikely that many people diagnosed with schizophrenia could provide the coherent transcript necessary to receive a autonomous (secure) rating thus it may not be an adequate measure of attachment security in this population.

Three studies have avoided the problems associated with using the AAI with people diagnosed with schizophrenia by using the self-report measure by Hazan and Shaver (1987), which yields three categories (secure, anxious and avoidant). Mickelson, Kessler and Shaver (1999) conducted the largest study of attachment and psychopathology to date, interviewing 8098 members of the general public. They found that 1.3% of their sample had a diagnosis of schizophrenia and this was significantly positively related to both types of attachment insecurity, more so for avoidant than anxious attachment (.78 vs .48). Schizophrenia diagnosis was negatively correlated to having a secure attachment style, but this did not reach significance. These findings were supported by a general population survey of 1,989

adolescents that found that those with avoidant and anxious attachment styles score significantly higher on a measure of 'psychoticism' than those with a secure style (Cooper, Shaver & Collins, 1998). The final study of attachment and psychosis using Hazan and Shaver's three category measure employed a sample of 30 male inpatients diagnosed with schizophrenia and compared them with a matched sample of 30 healthy volunteers (Ponizovsky, Nechamkin & Rosca, 2007). The control group was significantly more likely to be rated as securely attached than the patient group (73%) vs 17%). The patient group were most commonly categorised as avoidant (57%) and around a quarter were categorised as anxious-ambivalent. They also investigated relationships between attachment styles and symptom severity as measured by the Positive and Negative Syndromes Scale (PANSS; Kay et al., 1987). They found that those with more severe positive symptoms scored significantly higher on both insecure attachment styles (avoidant and anxious-ambivalent) and significantly lower on secure attachment. Those who had more severe negative symptoms also scored higher on avoidant attachment, but showed no significant differences on anxious or secure scales. These three studies suggest that psychosis is related to insecure attachment, avoidant attachment in particular. However, as stated before, using this three-category measure ignores the fact that there are two forms of avoidance: dismissing (self-reliance) and fearful (fear of rejection). Berry, Barrowclough and Wearden (2007) suggest that the fearful style might be more prevalent in psychotic samples as it is characterised by both a negative view of self and others, whereas dismissing is negative view of others but a positive view of self.

Attachment and psychotic symptoms

The studies reviewed above have all examined associations between attachment and schizophrenia. Ponizovsky *et al.*'s (2007) study reflects the current move towards studying symptoms or 'complaints' rather than unreliable diagnostic categories (Bentall, 2003; 2006). More recent studies have taken a symptom-focussed approach, the majority investigating schizotypy or psychosis proneness but three studies have focused specifically on specific symptoms such as hallucinations or paranoia. All have employed non-clinical samples, usually undergraduate students.

These more recent studies also reflect the recent change in attachment research, a move away from categorising attachment into distinct styles and towards envisaging it

as dimensional concept, particularly dividing it into attachment anxiety (model of self) and attachment avoidance (model of others).

Wilson and Constanzo (1996) were the first to investigate associations between attachment and schizotypy. They found that secure attachment was associated with low levels of schizotypy, anxious-ambivalent attachment was associated with higher levels of positive schizotypy and avoidant attachment was associated with higher levels of both positive and negative schizotypy. This is the same pattern found by Ponizovsky *et al.* (2007) in their study of positive and negative schizotypy in sample of patients with schizophrenia and a study of positive and negative schizotypy in non-clinical participants by Berry, Wearden, Barrowclough and Liversidge (2006).

Berry et al. (2006) criticised Wilson and Constanzo for not including paranoia in their measurement of schizotypy and for not controlling for the influence of negative affect, which has been shown to predict the extent to which participants report symptoms. After controlling for negative affect, Berry et al. found significant positive relationships between attachment anxiety and positive schizotypy (paranoid thinking and predisposition to hallucinations) and significant positive relationships between attachment avoidance and positive schizotypy (paranoid thinking) and negative schizotypy (social anhedonia). However, in a later study, using a different measure of schizotypy (O-LIFE; Mason, Claridge & Jackson, 1995), Berry, Band, Corcoran, Barrowclough et al. (2007) found positive associations between both attachment anxiety and avoidance and all schizotypy scales, except for between anxiety and non-conformity. This may be due to the differential measurement of schizotypy or the fact that negative affect was controlled for in the first study but not in the second. Stronger relationships were found between anxiety and positive schizotypy and between avoidance and negative schizotypy. The 'Unusual Experiences' subscale (perhaps the subscale closest to hallucinations) was positively associated with both anxiety and avoidance but best predicted by avoidance.

A recent study (Meins, Jones, Fernyhough, Hurndall *et al.*, 2008) using another measure of schizotypy (SPQ; Raine, 1991) found attachment predicted all negative schizotypy scales but that the only positive trait predicted by attachment was suspiciousness/paranoia and this was related to anxiety only and not avoidance. Thus

it is not clear from these schizotypy studies whether the symptom of interest in this thesis (AVH) is related to attachment and if it is, whether it is related to attachment anxiety or avoidance, or both. The conflicting results are possibly due to differing measures of schizotypy used and that none (except Berry *et al.*, 2006) measured hallucinations directly.

Three recent studies have studied phenomena akin to psychotic symptomatology rather than the wider categories of positive and negative schizotypy. These studies have used measures of hallucination-proneness and paranoid thinking in non-clinical undergraduate samples and looked for associations with attachment. The first study, already described above, found that predisposition to hallucinations was related to attachment anxiety (Berry *et al.*, 2006). This finding was questioned by Pickering, Simpson and Bentall (2008) given that hallucinations and paranoid beliefs are generally highly correlated. They hypothesised that any association between attachment and hallucinations would disappear after controlling for paranoia. This was exactly what they found in their non-clinical sample: attachment anxiety and avoidance were not predictors of hallucinations when controlling for paranoia. They did find a robust relationship between attachment and paranoia and that this relationship was partially mediated by self-esteem, anticipation of threat and the perception of others as powerful.

The finding that paranoia, but not hallucinations, is strongly associated with attachment is supported by recent work by Macbeth, Schwannauer and Gumley (2008). In a sample of 213 undergraduates, they found significant positive correlations between both attachment dimensions (anxiety and avoidance) and paranoid thinking and hallucination proneness, respectively. However, after controlling for anxiety, only the correlations between attachment and paranoid thinking remained significant. The authors then used covariance structural equation modelling to test models of predictors of both paranoia and hallucinations. The model for paranoia suggested that it was predicted by attachment (a combination of anxiety and avoidance), with extra predictive value added by the inclusion of 'interpersonal distancing'. However, the model for hallucinations was not so straightforward. Attachment avoidance and interpersonal distancing combined to form a latent construct they named 'avoidance' which directly predicted hallucinations.

Attachment anxiety and interpersonal affiliating combined to form a latent construct named 'dependence'. The relationship between 'dependence' and hallucinations was mediated by anxiety. The authors suggest that this conflicting model is reminiscent of disorganised attachment, where the individual flits between anxiety and avoidance, which has been linked to trauma and psychopathology. They also suggest that their model supports Birchwood *et al.*'s (2004) findings of associations between interpersonal schemata and distress in voice-hearers.

3.3 Parental bonding and psychosis

It is difficult to adequately measure attachment in adults. The AAI has problems in that it requires that the interviewer has received specialist training, it is time consuming and may not be useful in psychotic populations as it measures attachment through coherence of speech. Available self-report measures are also not ideal as they measure attachment through what the respondent says they feel about adult relationships. A commonly used self-report measure of childhood attachment that can be used with adults is the Parental Bonding Instrument (PBI; Parker, Fairley, Greenwood, Jurd et al., 1979). The PBI measures a respondent's recollection of their relationship with their mother and father during the first sixteen years of their life. There are two subscales: care and overprotection. 'Optimal parenting' is represented by high care scores and low overprotection scores, the opposite pattern is called 'affectionless control'. High scores on both scales is labelled 'affectionate constraint' whereas low scores on both is called 'neglectful parenting'. Most studies report that people diagnosed with schizophrenia score their parents as less caring and more overprotective (ie. affectionless control) than control participants (Parker et al., 1982; Onstad, Skre, Torgersen & Kringlen, 1994; Winther Helegeland & Torgersen, 1997; Willinger, Heiden, Meszaros, Formann & Aschauer, 2002).

The first study of perceived parental bonding in people diagnosed with schizophrenia reported that they scored significantly lower on maternal and paternal care than controls (Parker *et al.*, 1982). They also reported significantly higher overprotection, but for fathers only. This is consistent with the results of a study comparing the PBI scores of people diagnosed with schizophrenia and their same-sex twin siblings who had no psychiatric disorder (Onstad *et al.*, 1994). The siblings diagnosed with schizophrenia gave significantly lower care ratings for both parents but the only

significant difference on overprotection was for fathers. These two studies suggest that care is more important than overprotection, and that specifically, the influence of fathers is more important. Read and Gumley (2008) investigated these possibilities by re-analysing data from studies that compared PBI scores from psychotic groups with non-psychotic groups. They calculated the percentage of significant differences between these two groups in six samples of father data and eight samples of mother data. They found significant differences in every comparison for paternal care, 75% of comparisons of mother care, 50% of comparisons of paternal overprotection and 37.5% of comparisons of maternal overprotection. Thus, 75% of the comparisons involving fathers were significant compared to 56% for mothers. An even larger difference was found between comparisons of care, where 86% were significant compared to only 43% for overprotection. Thus supporting the idea that ratings of care, and of fathers compared to mothers, are more important in psychopathology.

However, studies described so far have employed cross-sectional methods, which prohibit causal inferences. Only one longitudinal study has been published, using the NEMESIS data described in Chapter 1. Janssen, Krabbendam, Hanssen, Bak *et al.* (2005) reported that lower baseline levels of perceived parental care (they summed maternal and paternal ratings) was associated with a greater risk of psychosis two years later, but found that there was no association between ratings of overprotection and psychosis.

Parental bonding and psychotic symptoms

The majority of studies have compared the PBI scores of people diagnosed with schizophrenia compared to those of control participants. There has been little research investigating relationships between PBI scores and specific psychotic symptoms. Two recent studies have compared the PBI scores of paranoid patients with control groups. Rankin, Bentall, Hill and Kinderman (2005) found that paranoid patients reported significantly less care and significantly more overprotection from both parents compared to healthy controls. In contast, Melo, Taylor and Bentall (2006) did not find any significant differences between paranoid patients and healthy controls on either paternal scale or on maternal overprotection. The only significant difference they found was that 'poor me' group rated their mothers as less caring than the control group and the 'bad me' group was left in between.

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Only one study has investigated perceived parental bonding in patients with AVH. Offen, Thomas and Waller (2003) investigated relationships between parental bonding and beliefs about voices in thirty-six patients with AVH. Interestingly it appeared that beliefs about voices' malevolence were specifically related to fathers' behaviours (care was significantly negatively related to malevolence and overprotection was significantly positively related to malevolence) and there were no significant associations with maternal behaviour.

Two recent studies have looked at associations between parental bonding and schizotypy in non-clinical student populations. Berry et al. (2007) found that maternal care was significantly negatively related to all three schizotypy subscales (unusual experiences, cognitive disorganisation and introvertive anhedonia) but that paternal care was not significantly related to any of them. They also found that both parental overprotection scores were significantly positively related to positive schizotypal scales (unusual experiences and cognitive disorganisation) but not to the negative schizotypy scale (Introvertive anhedonia). Mein et al. (2008) questioned whether the mixed findings surrounding overprotection could be due to the two factor solution of the PBI, so tried out a three factor solution, where 'overprotection' was divided into 'Denial of Psychological Autonomy' and 'Encouragement of Behavioural Freedom' (Murphy, Brewin & Silka, 1997). However they still failed to find any associations between overprotection and schizotypy. The only positive schizotypal trait that was related to parental bonding was suspiciousness/paranoia, those who perceived either parent to be less caring had higher levels of this trait. They also found that paternal rather than maternal factors made independent contributions to the prediction of schizotypy.

3.4 Conclusions and hypotheses

This chapter has reviewed attachment theory and described how insecure attachment is associated with psychopathology in adulthood. Those diagnosed with schizophrenia have higher levels of insecure attachment, particularly avoidant attachment, than nonpsychiatric groups (Dozier, 1990; Dozier *et al.*, 1991; Ponizovsky *et al.*, 2007). In patients diagnosed with schizophrenia, positive symptoms are positively associated with both anxious and avoidant attachment, whereas negative symptoms are associated with avoidant attachment only (Ponizovksy *et al.*, 2007). The relationship between positive symptoms and both anxious and avoidant attachment on one hand, and between negative symptoms and avoidant attachment on the other, has been replicated in non-clinical samples (Wilson & Constanzo, 1996; Berry *et al.*, 2006). While some have found associations between attachment and predisposition to hallucinations in non-clinical samples (Berry *et al.*, 2006), others have shown that this relationship disappears once confounding factors such as paranoia or anxiety are controlled for (Pickering *et al.*, 2008; MacBeth *et al.*, 2008).

Another method of examining the influence of early attachment relationships on adult mental health is to use measures of perceived parental bonding. Research involving people diagnosed with schizophrenia generally demonstrates that they rate their parents as being less caring and more overprotective in childhood compared to controls (e.g. Parker *et al.*, 1982; Onstad *et al.*, 1993; Winther Helegeland *et al.*, 1997; Willinger *et al.*, 2002). The evidence suggests that the care component may be more important than the overprotection component (Janssen *et al.*, 2005; Read & Gumley, 2008) and that the influence of fathers is stronger than that of mothers (Read & Gumley, 2008). As with studies of patient samples, studies using non-clinical subjects have emphasised the role of care, have reported mixed findings on the importance of overprotection (Berry *et al.*, 2007; Meins *et al.*, 2008), and have suggested that the role of fathers may be more important than that of mothers (Mein *et al.*, 2008; Offen *et al.*, 2003).

Studies that have directly investigated associations between attachment and hallucinations have found that any relationships disappear once confounding variables are controlled for (Pickering *et al.*, 2008; MacBeth *et al.*, 2008). This supports Bentall & Fernyhough's (2008) cognitive model of psychotic symptoms which suggests insecure attachment is an important predisposing factor for paranoid beliefs but not for hallucinations. It may be that insecure attachment is not associated with the development of hallucinations but it may be related to a voice-hearer's beliefs about their voices and subsequent distress. Offen *et al.* (2003) reported that voice-hearers' beliefs about voices were related to their perceptions of their father's behaviours during childhood and adolescence. This supports assertions of cognitive models that negative beliefs about AVH are mirrored by negative interpersonal schemata which

have been influenced by early experiences with others (Garety et al., 2001; 2007; Birchwood et al., 2004).

The present study will be the first to measure adult attachment in relation to AVH in voice hearers, both clinical and non-clinical. This is distinct from previous work which has examined associations between attachment and diagnoses, schizotypy or hallucination-proneness. In light of the research review presented, the following differences between the two groups can be hypothesised:

- 1. The clinical group will be more insecurely attached than the non-clinical group.
- 2. The clinical group will rate their parents as less caring and more overprotective than the non-clinical group.
- 3. In accordance with clinical models of psychosis, insecure attachment will be associated with distress associated with AVH, mediated by beliefs about voices.

Chapter 4: Environmental Factors in AVH: b) Trauma

Cognitive models of psychosis suggest that AVH are more likely to develop in those who have experienced adversity and that negative interpretations of AVH are more likely to be made by those who have had early adverse experiences of other people. It is suggested that early adverse experiences of other people lead to the development of negative interpersonal schemata that influence perceptions of self and others in the social world, as well as perceptions of voices. Chapter 3 discussed the influence of attachment in the development of clinical and non-clinical AVH, the current chapter discusses the influence of trauma.

4.1 Trauma and psychosis

Numerous studies have reported that individuals with psychosis have an increased frequency of trauma in their life histories. Read, van Os, Morrison and Ross (2005) reviewed the literature and concluded that child abuse was a causal factor in psychosis, however other authors were less convinced by their conclusion and argued that more research was needed (Bendall, Jackson, Hulbert & McGorry, 2008; Morgan & Fisher, 2007). When the 2005 review was published the vast majority of studies investigating the association between trauma and psychosis were small, correlational studies that did not control for potentially mediating variables. Only three well-controlled population studies were included in that review, these will be described below along with four studies that have been published since the 2005 review.

Cross-sectional studies

Two cross-sectional studies have examined relationships between trauma and psychosis in large adult general population survey samples (Bebbington, Bhugra, Brugha, Singleton *et al.*, 2004; Shevlin, Houston, Dorahy & Adamson, 2008). Bebbington *et al.* (2004) reported that the respondents who had experienced sexual abuse were fifteen times more likely to be in the psychosis group than those who had not. After controlling for the potentially confounding effect of the interrelationship between traumatic events and depression, the odds ratio (OR) was reduced dramatically but remained significant at 2.9. Similar ORs were reported for running away from home (2.8), being homeless (2.18) and being a victim of serious injury,

illness or assault (2.9). However, measuring the risk of developing psychosis after experiencing one type of event and controlling for experiencing other events masks the possibility that there is a cumulative risk and there is a dose-response relationship between trauma and psychosis. Shevlin *et al.* (2008) found such a dose-response relationship between trauma and psychosis in two population survey samples, even after controlling for eleven potentially confounding variables. They found that as the number of trauma experienced increased, so did the individual's risk of developing psychosis. They also found interpersonal traumas such as physical and sexual abuse were particularly linked to psychosis.

In addition to these two cross-sectional studies involving adult samples, two recently published studies have investigated the association between childhood trauma and psychotic symptoms in non-clinical adolescent populations. Kelleher, Harvey, Lynch, Arsenault *et al.* (2008) interviewed 211 adolescents and reported that those who experienced psychotic symptoms were six times more likely to have experienced physical abuse and ten times more likely to have been exposed to domestic abuse than those who did not report psychotic symptoms. They were also four times more likely to have suffered sexual abuse as children but this figure was not statistically significant possibly because of the small number of individuals who reported this experience (4 out of a sample of 211).

Lataster, van Os, Drukker, Henquet *et al.* (2006) used self-report questionnaires to measure non-clinical psychotic experiences in 1290 adolescents and experience of bullying and sexual trauma. After controlling for age, sex and socioeconomic status, experience of bullying and unwanted sexual experiences were associated with a three and four and a half times higher risk of experiencing non-clinical psychotic symptoms, respectively. As in Shevlin *et al.*'s (2008) study of adult participants, a dose-response relationship between trauma and psychotic symptoms was found, i.e. the more frequently a child was bullied, the more likely they were to develop psychotic symptoms. This relationship could not be examined with regards to sexual trauma as it was merely reported as present or absent. A dose-response relationship was also found in the other direction – those with more severe psychotic symptoms were more likely to have suffered past trauma.

Prospective studies

The four cross-sectional studies described above demonstrate an association between trauma and psychosis and suggest that this is a dose-response relationship. These studies have improved upon previous research by employing large samples and controlling for possible confounding variables. However, the relationships they describe can not be assumed to be causal (although this is more plausible in the case of dose-response relationships) as both variables are measured together in time, either one could cause the other e.g. it is plausible that a person with psychotic experiences could be more prone to being bullied, or more prone to reporting it. Prospective studies measure trauma that occurs before the development of psychotic symptoms in a bid to establish causality. Three such studies are described below, two supported an association between trauma and psychosis whereas a third study did not.

Janssen, Krabbendam, Bak, Hanssen *et al.* (2004) used data from the NEMESIS study, described in Chapter 1. They measured physical, emotional and sexual abuse before the age of sixteen at baseline and three levels of psychotic outcomes (any psychosis, pathology level psychosis and need for care) at follow up two years later. After controlling for fourteen possibly confounding variables, they found that those who had experienced any childhood abuse were between 2.5 and 7.3 times more likely to be diagnosed as experiencing psychosis (depending on the psychosis outcome measure used). They also showed that this was dose-response relationship, with those who had suffered more abuse having a higher risk of developing psychosis. Similarly, Spauwen, Krabbendam, Lieb, Wittchen et al (2006) measured exposure to traumatic events at baseline and measured psychotic symptoms at follow up (mean of 42 months later) in 2524 young adults and adolescents. They too found a dose-response relationship after controlling for six possible confounding variables. Their data suggested a specific relationship between trauma and psychosis as there were no associations between trauma and bipolar disorder or major depression.

All of the studies described so far have relied on self-report of trauma which could be subject to recall and social desirability biases. One prospective study has circumvented this problem by identifying historical cases of sexual abuse on official records and cross-referencing these with current registers of mental health diagnoses (Spataro, Mullen, Burgess, Wells *et al.*, 2004). This study found men who had been

sexually abused as children were 1.3 times more likely to be diagnosed with schizophrenia later in life and women also had a 1.5 times higher risk. However these findings were not significant. The authors acknowledge there were many systematic biases in the study that would reduce the probability of finding significant associations between sexual abuse and psychological disorders. Their sample of people who had experienced child abuse was probably not representative of the wider population of people who have experienced such abuse as they had suffered severe abuse that had been the subject of an intervention by police and social services. It is likely that the majority of sexual abuse is not as severe and goes unreported. The fact that statutory services had intervened may also have meant that the abuse was stopped and this might have reduced the risk of these participants developing psychosis. In addition, they did not screen their control group for abuse and it is likely that a number of those people did experience abuse and so this would reduce differences between the two groups. Their measure of psychosis was also highly selective as it only covered those diagnosed with schizophrenia, ignoring all those with lesser symptoms who either confine their contact to GPs or private therapists or eschew professional help altogether.

4.2 Trauma and AVH

Research in psychiatric samples suggest high rates of trauma in voice-hearers, e.g. some studies have suggested rates as high as 86% for patients diagnosed with dissociative disorder, 83% of patients diagnosed with schizophrenia and 37% of patients diagnosed with bipolar disorder (Honig, Romme, Ensink, Escher *et al.*, 1998; Hammersley, Dias, Todd, Bowen-Jones *et al.*, 2003). Read, Agar, Argyle and Aderhold (2003) studied 200 outpatients and reported that those who had suffered abuse (92 people) had significantly higher rates of AVH compared to those who had not suffered abuse (38% vs 17.6%). Their results also suggest that the more severe the trauma, the more likely that AVH would be reported. AVH were most common in those participants who had suffered repeated abuse such as both sexual and physical abuse in childhood (64.2% of this group had AVH) or both childhood and adulthood sexual abuse (71.4% of this group had AVH).

High rates of trauma are not just found in clinical samples but in those containing voice-hearers who have never received treatment for their voices, between 73-76% of

non-clinical voice-hearers report a history of trauma (Honig *et al.*, 1998; Andrew *et al.*, 2008). In addition to adult samples, high rates of trauma are reported in clinical and non-clinical samples of children who hear voices, Romme & Escher (2006) reported that 86% of their sample of 80 voice-hearing children reported one or more traumas occurring around the time that they started hearing voices.

As well as being found in clinical and non-clinical voice-hearers, associations between trauma and predisposition to hallucinations have been reported in nonclinical student samples. Morrison and Petersen (2003) found that those who had suffered multiple traumas had significantly higher predisposition to AVH than those who had suffered a single trauma. They found significant associations between predisposition to AVH and experience of bereavement, emotional abuse and physical assault but, unlike other studies, failed to find significant associations between predisposition to AVH and bullying and sexual abuse, respectively. This may be due to the low number of respondents endorsing these events in a small, non-clinical sample. A later study, with a larger sample, did find a significant positive association between bullying and predisposition to AVH (Campbell & Morrison, 2007).

The studies reviewed above demonstrate associations between trauma and AVH but suffer from a number of methodological limitations, most importantly their use of small, uncontrolled samples limits the generalisability of their findings and their ability to find statistically precise results. Three recent studies have improved the literature by employing large population samples and controlling for confounding variables, two using cross-sectional designs and one utilising a prospective design.

Whitfield, Dube, Felitti and Anda (2005) conducted a large cross-sectional population survey of 17,337 adults which measured the incidence and frequency of eight categories of adverse childhood events (ACEs). Participants were defined as having a history of hallucinations if they responded affirmatively to the question "Have you ever had, or do you have, hallucinations (seen, smelled or heard things that weren't really there)?" They also measured drug and alcohol abuse with three similar simple questions. The lifetime rate of hallucinations was 2% and positive associations were found between each ACE and presence of hallucinations. After controlling for age, sex, race and education, the risk of having hallucinations given experience of a ACE

was increased 1.2 to 2.5-fold, e.g. those who had experienced sexual abuse were 1.7 times more likely to have hallucinations and those who had experienced emotional abuse were 2.3 times more likely to have hallucinations. They also found a dose-response relationship, with those who had experienced more ACEs being more likely to have experienced hallucinations. This study gives an impression of an association between trauma and hallucinations but would have been more illuminating with a better measure of hallucinations. Detailed data beyond recording mere presence of hallucinations such as modality, frequency, form, content, associated distress etc would have been of great interest.

Shevlin, Dorahy and Adamson (2007) conducted a similar study, using data from large general population survey of 5,877 people. Their hallucination measure was similarly crude (participants were asked if they had ever experienced visual, auditory or tactile hallucinations) which permitted investigations of hallucinations in terms of modality but did not provide information on other interesting dimensions of hallucinations such as frequency, form, content, distress etc. They also documented the lifetime presence or absence of neglect, physical or sexual abuse. Significant and dose-response relationships between trauma and hallucinations were found, even after controlling for eight confounding variables. Those who had experienced sexual trauma were significantly more likely to experience hallucinations than those who had not (ORs = rape 1.8, molestation 1.9) but there were no significant associations between physical abuse or neglect and auditory hallucinations. The authors also found a dose-response relationship between number of traumas and risk of auditory hallucinations, those who had experienced one trauma had 1.6 times more risk of experiencing AVH and those who had experienced all four types of trauma had 3.8 times more risk.

The only study to examine the association between trauma and hallucinations prospectively has been described in more detail above (Janssen *et al.*, 2004). Using data from the NEMESIS study, the authors reported that those who had experienced childhood abuse had four times the rate of hallucinations compared to those who had not experienced such abuse. However, this was reduced to OR of 2.5 and was statistically non-significant after controlling for fourteen possibly confounding factors.

Trauma and phenomenology of AVH

The majority of studies of trauma and AVH have examined associations between the experience of the two phenomena but do not go beyond mere presence to provide any information on how trauma may affect the phenomenology of AVH. Only a few studies have reported on associations between trauma exposure and more qualitative aspects of AVH, such as form and content. Read *et al.* (2003) reported that commenting and commanding voices were significantly associated with either physical or sexual abuse in childhood or adulthood. Such negative voices were most common in those who had suffered sexual abuse in both childhood and adulthood, 57% of whom heard voices commenting and 29% of whom heard voices commanding them. Hammersley *et al.* (2003) also found an significant association between abuse and commenting voices.

Studies that have examined whether the content of AVH can be directly related to trauma suffered by the voice-hearer have found that this is only the case for a minority of individuals. Read and Argyle (1999) reported an association between trauma and voice content in three out of seven participants. The same research group later gave case examples where a direct link could be elucidated between the abuse and the content of AVH, for example, the participant hearing the voice of their abuser (Read *et al.*, 2003). Their results suggested an association between severity of abuse and sexual or evil content; the only significant predictor of such content was combined child and adult abuse. They found that those who had experienced both sexual and physical abuse in childhood were seven times more likely to hear voices with sexual content compared to those who had not been abused. Those who had experienced sexual abuse as children and again as adults were ten times more likely than those who had not been abused to hear voices with content referring to the devil or evil.

Hardy, Fowler, Freeman, Smith *et al.* (2005) explored associations between trauma and content of hallucinations in seventy-five psychotic patients, forty of whom had experienced trauma, most commonly sexual abuse (36.5%) or bullying (30%). Direct associations between traumatic events and the content of hallucinations were only found for 12.5% of participants, it was far more common that the themes of trauma and hallucinations were similar (in 57.5% of participants) or for no association to be

apparent (in 42.5% of participants). These groups were not mutually exclusive; all the participants with direct associations between trauma and hallucinations also reported indirect associations. The authors interpreted their findings as suggesting that trauma is more likely to affect hallucinations through its influence on emotion and beliefs as suggested by recent cognitive models of psychosis (e.g. Garety *et al.*, 2001; 2007) than through its influence on memory as suggested by cognitive models of PTSD (Ehlers & Clark, 2000). They also acknowledge that their findings suggest that factors other than trauma must determine the nature of hallucinations in most individuals.

Trauma and beliefs about AVH

Hardy et al. (2005) suggest that trauma may impact on hallucinations through its influence on emotions and beliefs. This proposition has been tested by two recent studies of the effect of trauma on beliefs about voices in voice-hearers, both from those from patient and non-patient populations. Offen, Waller and Thomas (2003) investigated associations between childhood sexual abuse and beliefs about voices in 26 psychotic patients who had AVH, ten of whom had experienced CSA. The abused patients tended to rate their voices as more malevolent but this difference was not significant. Malevolence was significantly negatively associated with age at first abuse, i.e. those who were abused at younger ages rated their voices as more malevolent. The failure to find a significant association between trauma and beliefs about voices may be explained by the small sample size (only ten sexually abused participants) and the narrow focus on childhood sexual abuse, it is possible that other interpersonal traumas such as physical abuse or bullying may be associated with beliefs about voices. Perhaps the finding that beliefs about malevolence was significantly associated with age at first abuse rather than presence of abuse means that the severity or impact of trauma may be the important factor.

A more recent study, discussed in greater detail in Chapter 1, has examined the effect of a range of traumatic experiences and post-traumatic symptomatology on beliefs about voices in a mixed group of clinical and non-clinical voice-hearers (Andrew *et al.*, 2008). Beliefs about voices were best predicted by a number of trauma variables but the best predictor was post-traumatic symptomatology. This supports the notion that it is not solely the experience of trauma that influences beliefs about voices but the continuing effects of that trauma. This may explain why sexual abuse and childhood trauma have stronger associations with AVH than other types of trauma.

4.3 Conclusions and hypotheses

There is evidence that voice-hearers have experienced high levels of trauma and there appears to be a dose-effect relationship, those who have experienced more trauma are more likely to hear voices. There is also some evidence that more severe interpersonal trauma is linked with malicious content. However, there are very few direct links between trauma and voice content, instead the themes of trauma seem linked to the themes of voices. These findings support cognitive models of AVH which suggest that trauma history influences beliefs about voices. Two studies have been published so far that demonstrate that beliefs about voices' power and intent are influenced by severity of trauma (Offen *et al.*, 1998; Andrew *et al.*, 2008).

Cognitive models suggest that early adverse experiences influence appraisals of AVH, mediated by their influence on interpersonal schemata. This proposition is supported by studies that have examined associations between negative cognitions about self and others, trauma and AVH. Kilcommons and Morrison (2005) found a significant positive association between negative cognitions about the self and the world (formed in response to trauma) and the presence of hallucinations in thirty-two patients diagnosed with psychotic disorders. However, the only significant predictor of hallucinations was depersonalisation. In a non-clinical student sample, Gracie, Freeman, Green, Garety *et al.* (2007) found that the best predictor of paranoia was negative cognitions about self and others. Predisposition to hallucinations was best predicted by post-traumatic symptomatology and, to a lesser extent, negative cognitions about others.

It may be suggested from the above findings that negative cognitions are related more to the development of paranoia and that a dissociative response/symptomatic response to trauma are more linked to hallucinations. However, these studies measured predisposition to hallucinations, not distress associated with hallucinations which is the focus of this thesis. It could be that negative cognitions about the self and others are not the main factors that drive predisposition to developing AVH but are a key factor in the distress associated with them. In support of this proposition, one study has found a significant positive association between negative cognitions about the self and negative AVH content and distress (Smith, Fowler, Freeman, Bebbington *et al.*, 2006). However, this study did not find an association between negative cognitions about others and any hallucination variables. This finding is consistent with Close and Garety's (1998) study that found associations between negative self-appraisals and low self-esteem were associated with AVH-related distress.

Negative interpersonal schemata are similar to the IWMs discussed in the previous chapter on attachment. The main difference is that IWMs are more emotionally charged in that they incorporate affect associated with relationships as well as beliefs (Berry et al., 2007). It was hypothesised in the previous chapter that insecure attachment, represented by negative IWMs of self (attachment anxiety) and others (attachment avoidance) would be predictive of distress associated with voices, mediated by beliefs about voices. Research reviewed in this chapter suggests that trauma, especially interpersonal trauma, would lead to the development of negative IWMs of self and others and hence more negative beliefs about voices. This suggestion is supported by previous theoretical developments in the study of associations between trauma and psychosis, that suggest attachment may be an important mediator of this relationship (Read & Gumley, 2008). Read and Gumley (2008) have proposed a model where interpersonal trauma such as abuse and loss in childhood lead to insecure attachment which can then lead on to the development of psychosis. The association between insecure attachment and psychosis is hypothesised to be mediated by effects on IWMs of self and others, theory of mind, sensitivity to stress and difficulties in interpersonal relationships.

Based on the current review of the literature, the following hypotheses are proposed:

- 1. The clinical group will have experienced more trauma (particularly interpersonal trauma such as sexual and physical abuse) and will exhibit more post-traumatic symptomatology than the non-clinical group.
- 2. Trauma will be associated with voice-related distress, mediated by beliefs about voices.

3. Trauma (especially of an interpersonal nature) will be associated with negative beliefs about voices, mediated by negative IWMs of self and others.

Chapter 5: Methods

The overall aim of this thesis is to explore the phenomenology of clinical and nonclinical AVH and to investigate the psychological and biological factors that distinguish them. Three distinct methods were employed; quantitative analysis of psychometric questionnaires, qualitative analysis of interview transcripts and functional magnetic resonance imaging (fMRI). Each participant was interviewed about their AVH and completed a battery of questionnaires designed to provide information on their AVH and life history. A subset of participants consented to undergoing fMRI whilst they were experiencing AVH.

This chapter describes the overall design of the study, how participants were recruited and which measures they completed for the quantitative analysis. More detailed information on the procedure for the qualitative analysis and the fMRI analysis can be found in the specific chapters devoted to these studies, namely Chapter 7: Qualitative Analysis and Chapter 8: fMRI. The current chapter and the subsequent one detail the methods and analysis for the quantitative analysis which was designed to test the hypotheses detailed in Chapters 2, 3 and 4.

5.1 Ethical approval

The study was approved by the North Wales Central Research Ethics Committee, a copy of their approval can be found in Appendix 1.

5.2 Recruitment

It is notoriously difficult to recruit psychotic patients for research and this was certainly the case for this project, perhaps the difficulty was increased because the study involved a brain scan, which deterred some potential participants. Though some were intrigued by the prospect of a brain scan, half of the participants finally recruited to the quantitative and qualitative studies did not consent to having a brain scan. However, it proved even more difficult to find and recruit non-psychiatric voice-hearers, perhaps understandably they are cautious about speaking to researcher from a psychology department about their AVH for fear of being labelled mentally ill. Indeed, seven of the non-psychiatric voice-hearers had not told anybody else about their AVH until they met with the investigator and one participant even asked for reassurance that she would not be referred to a psychiatrist as she was fearful of being sectioned, despite having benign AVH and no difficulties functioning. It took two years to recruit the required number of participants, details of the participants and of how they were recruited are included in the following sections.

5.3 Participants

To be included in the study, all participants had to be at least 16 years of age, to have heard voices for at least six months and be able to give informed consent. Participants were excluded if their voices were thought to be the result of substance misuse or organic disorder. In addition, to be eligible to join the non-clinical group, participants could not be seeking or receiving treatment for their voices from mental health services. All participants reported hearing voices in the previous two weeks and were able to provide informed consent. The mean length of time hearing voices was 19.4 years (S.D. = 16.0). There were 21 males and 19 females, the mean age of the sample was 37.7 years (S.D. = 15.4) and the majority were single (67.5%). The two groups are described separately below.

Clinical group

Clinical participants were recruited from mental health services in North West Wales NHS Trust and North East Wales NHS Trust. They were identified in research ward rounds and from personal contact by the researchers to Consultant Psychiatrists. Once a potential participant was identified, their Consultant Psychiatrists was asked for permission to approach the individual. 52 potential participants were identified but only 20 participated. From the 32 people who did not participate (6 of whom were female), 3 people were not deemed well enough to participate by their consultants, 4 denied hearing voices and the remaining 25 did not want to participate and did not give a reason. Apart from their gender, no other information was available about the non-participators.

There were 13 males and 7 females, with a mean age of 36 years (range 16-66). The majority had a good standard of education (12 had secondary school level education, 2 had higher education) and the majority were unemployed due to mental ill health (16 people). Most of the participants in this group (17 people) were single. The average length of time of hearing voices was 16 years (range 6 months – 50 years).
There was a wide range of explanations given about voices; 4 participants attributed them to spiritual or paranormal sources, 5 attributed them to their mental health problems, 4 believed they were caused by their use of drugs and 2 believed they had been caused by stress, 3 people believed that they were telepathic and 2 people did not have a clear idea of why they heard voices. 1 person had not been given a formal diagnosis but the rest had diagnoses ranging from schizophrenia (14 people), Dissociative Identity Disorder (1 person), Bipolar disorder (1 person), Borderline Personality Disorder (1 person) and Atypical Psychosis (1 person). The mean length of time since diagnosis was 10 years (range: 6 months to 28 years). 2 participants were no longer patients but of the remaining 18, 11 were outpatients and 7 were inpatients at the time of the study. 17 of the 20 participants were taking antipsychotic medication.

Non-clinical group

The first attempts to find and recruit non-clinical voice-hearers involved replicating Andrew et al.'s (2008) method where spiritualist churches were contacted and a snowball technique was employed where interested individuals gave information sheets to other spiritualists that they thought would be interested. This only yielded six participants. The investigators thought that in-depth interviews in the local media might attract participants as it would give the investigators opportunity to reach a wider audience and explain the project in detail, hopefully allaying any fears nonclinical voice hearers might have about participating in such a project. One investigator (K.T.) published an article about benign AVH in a local new age magazine and took part in interviews with a number of local newspapers, another investigator (M.J.) took part in a local radio programme, both talking about benign voices and appealing for volunteers. There were no responses to the newspaper or radio interviews and only three responses to the magazine article. Of these three responses, only one person became a participant as the other two were not suitable (one was merely wishing the investigator well, and the other had only had a one-off experience over fifty years ago). As word of mouth and local media interviews had only produced seven participants in twelve months, it was decided to directly advertise for participants in the local media and to advertise that an honorarium was being offered. A copy of the advert is in Appendix 2. This proved far more

successful and yielded seven participants from an advert on the university's website and six participants from a series of local newspaper adverts.

There were 8 males and 12 females, with a mean age of 39 years (range 17-63). The majority had a good standard of education (11 secondary education, 3 higher education) and the majority (15 people) were employed. 7 participants used their AVH to provide 'readings', mostly as spiritualist mediums (6 people) and 1 worked as an 'animal communicator', three of them charged for their services. Half of the group were in a relationship. None of the participants had a diagnosis and none were taking any psychiatric medication. The average length of time of hearing voices was 21 years (range 2-58) and the explanation of voices ranged from spiritual or paranormal sources (12), psychological factors such as creativity, intuition or loneliness (3) and five did not have an explanation for their voices.

5.4 Measures

Participants were interviewed to assess psychopathology (PANSS) and were given a battery of questionnaires to measure voices (PSYRATS, BAVQ-R), attachment (RSQ, PBI), trauma (PDS) and metacognitive beliefs (MCQ-30). The interview and questionnaire battery took around 60 minutes to complete and this was broken down into two sessions if the participant grew fatigued. One investigator (K.T.) interviewed all participants and gave the participants the questionnaires to fill in themselves. Some participants requested that the investigator read out the items and score the questionnaires for them due to their impaired reading ability.

Mental Health Assessment

The Positive and Negative Symptom Scale (PANSS; Kay, Fiszbein & Opler, 1987)

The PANSS is a 30-item semi-structured interview measure of psychotic symptoms. Each item is scored between 1 (not present) and 7 (severe). The PANSS consists of three subscales: positive symptoms (7 items, e.g. hallucinations, delusions); negative symptoms (7 items, e.g. blunted affect, emotional withdrawal) and general psychopathology (16 items, e.g. anxiety, depression, guilt feelings). It has good construct validity and high internal validity (Kay, Opler & Lindermeyer, 1988; Peralta & Cuesta, 1994). The investigator (KT) received training to administer and score the PANSS.

Assessment of Voices

Psychotic Symptom Rating Scales – Auditory Hallucinations Subscale (PSYRATS-AH; Haddock, McCarron, Tarrier & Faragher, 1999)

The PSYRATS consists of two subscales, one measuring auditory hallucinations and one measuring delusions, only the auditory hallucination subscale was used in this study. There are 11 items corresponding to 11 dimensions of auditory hallucinations: frequency, duration, location, loudness, beliefs about the origin of voices, amount and degree of negative content, amount and intensity of distress, disruption caused by voices and the level of control the respondent has over their voices. Each item is scored on a 5-point ordinal scale (0-4). The PSYRATS-AH has excellent inter-rater reliability (Haddock *et al.*, 1999)

Belief About Voices Questionnaire – Revised version (BAVQ-R; Chadwick, Lees & Birchwood, 2000)

The BAVQ-R is a 35-item measure of voice-hearers' beliefs about auditory hallucinations and their emotional and behavioural reactions to them. There are three subscales relating to beliefs about malevolence (6 items, e.g. 'My voice is punishing me for something I have done'), benevolence (6 items, e.g. 'My voice wants to protect me') and omnipotence (6 items, e.g. 'My voice is very powerful'). There are two further subscales which measure emotional and behavioural reactions ('resistance' and 'engagement'). 'Resistance' consists of 5 items on emotional resistance (e.g. 'My voice frightens me) and 4 items on behavioural resistance (e.g. 'When I hear my voice, I usually tell it to leave me alone'). 'Engagement' consists of 4 items on emotional engagement (e.g. 'My voice reassures me') and 4 items on behavioural engagement (e.g. 'When I hear my voice, I usually listen to it because I want to'). In the case of hearing multiple voices, the respondent is required to fill in the BAVQ-R for the most dominant voice only. Each item is scored indicating the extent to which the respondent agrees with each statement, in the last week, on a 4-point ordinal scale (0-3). The BAVQ-R is reliable and has good construct validity (Chadwick et al., 2000).

Assessment of Attachment

Parental Bonding Instrument (PBI; Parker, Tupling & Brown, 1979)

The PBI is a 25-item self-report questionnaire that measures early attachment, it comprises of the Protection Scale (13 items) and the Care Scale (12 items). Participants are asked to indicate, on a four-point Likert scale, the extent to which each item is characteristic of their mother and father's attitudes and behaviours in their first 16 years of life. Low scores on the Care Scale reflect perceived parental neglect and rejection, whereas high scores reflect perceived parental warmth and affection. High scores on the Protection Scale indicate perceived excessive control and intrusive parenting, whereas low scores suggest perceived parental acceptance of a child's independence and autonomy. The PBI has good test-retest reliability and validity (Parker *et al.*, 1979; Parker, Fairley, Greenwood, Jurd *et al.*, 1982).

Relationship Scales Questionnaire (RSQ; Griffin & Bartholomew, 1994)

The RSQ is a 30-item self-report questionnaire that measures adult attachment. Participants are asked to rate each of its items (describing 'feelings about close relationships') on a five-point Likert scale. The scale items represent an amalgam of other self-report adult attachment measures e.g. Hazan and Shaver's (1987) measure and Collins and Read's (1990) Revised Adult Attachment Scale. The RSQ yields scores on six subscales but can also be scored for four attachment categories (secure, preoccupied, dismissing and fearful). However, Bartholomew states that the RSQ was never intended to be scored categorically and recommends the two factor dimensional scoring method suggested by Kurdek (2002). These two underlying dimensions can be conceptualised either in cognitive terms (Bowlby's IWMs; model of self vs model of others) or in affective-behavioural terms (attachment anxiety vs attachment avoidance). Attachment anxiety measures an individual's self worth (corresponds to 'model of self') and attachment avoidance measures an individual's desire for intimacy with other people (corresponds to 'model of others').

Assessment of Trauma

Post-traumatic Diagnostic Scale (PDS; Foa, 1995)

The PDS measures the occurrence of traumatic life events and any associated posttraumatic symptomatology. It has 49 items which are split into four parts. It can be used as an aid to diagnosing PTSD as it measures all the criteria listed in the DSM-IV (APA, 1994). Parts 1 and 2 (corresponds to criterion A in DSM-IV) requires the respondent to indicate (by ticking a box) which traumatic life events (e.g. serious accident, sexual assault, imprisonment) they have witnessed or experienced. Respondents are then required to choose the most traumatic event and briefly describe it. Part 3 requires the respondent to indicate the extent of their post-traumatic symptoms (corresponds to criteria B to D) and Part 4 measures any subsequent impairment in functioning. The PDS has good reliability and validity (Foa, Riggs, Dancu & Rothbaum, 1993).

Assessment of Metacognitive beliefs

Metacognitions Questionnaire 30 (MCQ-30; Wells & Cartwright-Hatton, 2004)

The MCQ-30 is a shortened version of the 65-item Metacognitions Questionnaire (Cartwright-Hatton & Wells, 1997) and was chosen to keep the questionnaire battery as brief as possible. It consists of 30 items and provides five subscales once scored 1) Positive beliefs about worry, 2) Negative beliefs about worry concerning uncontrollability and danger, 3) Cognitive Confidence, 4) Negative beliefs about thoughts concerning the need to control thoughts and 5) Cognitive self-consciousness. The MCQ-30 has good internal consistency, convergent validity and test re-test reliability (Wells & Cartwright-Hatton, 2004; Spada, Mohiyeddini & Wells, 2008).

5.5 Procedure

All interested potential participants were given a detailed participant information sheet to read at their leisure and decide if they would like to participate. They were encouraged to ask questions and discuss the nature of the project with the investigator, with no obligation to take part. If they did decide to participate, they provided written informed consent before completing the above measures. Copies of the information sheets and consent sheets can be found in Appendices 3 to 6. All participants completed parts 1 and 2 of the project (semi-structured interview and questionnaire battery), only a few completed part 3 (fMRI). Each participant was given an honorarium for their time.

All participants were first interviewed by the investigator using a specially developed semi-structured interview covering their life history, experiences of and beliefs about their voices. A copy of the interview schedule is in Appendix 7. The interview was completed first so that each participant could explain their experiences fully and in their own words (especially important for the non-clinical voice-hearers, many of

whom disapproved of the wording used by psychiatric self-report assessments) and allow the development of trust and rapport, which would be essential to allow the participant to feel comfortable talking about trauma and to undergo a brain scan (which was a worrying prospect for some participants). The interviews were recorded, transcribed and qualitatively analysed using interpretative phenomenological analysis. Chapter 7 details the interviews and analysis in full.

In a separate session from the semi-structured interview, all participants completed the self-report questionnaire battery. A few participants asked the investigator to read out the items and score them for them as they were not confident of their reading ability. They completed the PANSS, the voices measures, the metacognition measure, the attachment measure and then the trauma measure. The trauma measure was completed last to give time to build rapport and in case the participant became upset and the session had to be aborted. No participant was unduly upset by the trauma measures. If a participant indicated that they had not experienced any of the traumatic events in part one of the PDS then the remainder of the questionnaire was not completed and the participant rated as having no trauma history.

Following completion of the interview and questionnaires, all participants were offered a brain scan but only 20 people consented to this. The procedure and analysis of fMRI data is described in full in Chapter 8.

Chapter 6: Comparing Clinical and Non-Clinical AVH: Study 1: Quantitative Data Analysis

6.1 Introduction

The overall aim of this thesis is to compare the AVH of clinical and non-clinical voice-hearers to learn more about the phenomenology of these experiences but also in an attempt to discern what factors influence their differential development, based on the predictions of recent cognitive models of AVH. This chapter details the quantitative analysis carried out to test the hypotheses proposed after consideration of previous literature in this area. The hypotheses suggested in chapters 2, 3 and 4 were:

Hypotheses of Group Differences

Cognitive Variables:

- There will not be significant differences between clinical and non-clinical voice-hearers in terms of whether they appraise their voice as originating from internal or external sources.
- 2. The clinical group will appraise their voices as more malevolent and omnipotent, and less benevolent, than the non-clinical group.
- The clinical group will have higher scores on the MCQ-30 than the nonclinical group.

Environmental Variables:

- 4. The clinical group will be more insecurely attached than the non-clinical group.
- 5. The clinical group will rate their parents as less caring and more overprotective than the non-clinical group.
- 6. The clinical group will have experienced more trauma (particularly interpersonal trauma such as sexual and physical abuse) and will exhibit more post-traumatic symptomatology than the non-clinical group.

Hypotheses testing Cognitive Models

- 7. Voice-related distress will be predicted by beliefs about voices.
- 8. Voice-related distress will be predicted by metacognitive beliefs, particularly beliefs about the need to control thoughts, even after controlling for the confounding effect of anxiety.

- 9. Insecure attachment will be associated with voice-related distress, mediated by beliefs about voices.
- 10. Trauma will be associated with voice-related distress, mediated by beliefs about voices.
- 11. Trauma (especially of an interpersonal nature) will be associated with negative beliefs about voices, mediated by negative IWMs of self and others.

The analysis begins with a comparison of demographic variables, in order to determine whether these two groups are well matched and whether the non-clinical group are, in fact, psychological healthy. Next, the phenomenological similarities and differences of AVH in these two groups are examined by analysing group differences on PSYRATS scores. The main body of this chapter analyses group differences on the main variables of interest, i.e. cognitive factors (beliefs about voices and beliefs about thinking) and environmental factors (attachment and trauma history) and then examines associations between these factors in the light of recent cognitive models of AVH.

6.2 Data analysis

The data were analysed using SPSS 12.0 for Windows. The main interval data variables (psychopathology, beliefs about voices, metacognitive beliefs, attachment and trauma) were tested for normality both visually using Q-Q plots and statistically using the Kolmogorov-Smirnov test. Attachment and Trauma variables were normally distributed but some of the subscales of the BAVQ-R and the MCQ-30 (measuring beliefs about voices, and metacognitive beliefs, respectively) were not normally distributed and none of the PANSS subscales (measuring psychopathology) were normally distributed. The non-clinical groups' scores were skewed towards lower levels whereas the clinical groups' scores were skewed towards higher levels of these measures. Normality was not attained by transformation and thus non-parametric tests were used to test for group differences and relationships between the variables (Mann-Whitney U and Spearman's Rho). Bonferroni's correction for multiple comparisons was not employed here as it would be too conservative for this small sample study.

Hypotheses derived from cognitive models of psychosis were tested using regression

analyses, with linear regression for continuous variables and logistic regression for categorical variables. These were performed despite the previous admission of nonnormality because multiple regression does not require normality of the variables themselves but of the residuals (and these were judged sufficiently normal after inspection of Q-Q plots and using the Durbin-Watson test) and logistic regression does not require normality. Mediation analyses were performed using Preacher and Hayes (2004) SPSS Macro.

6.3 Demographic data

Group differences were investigated using Mann-Whitney U test for continuous variables and Chi-square test for categorical variables. The results are displayed in Table 6.1 below.

	Non-clinical (n=20)	Clinical (n=20)	Sig.
Age (years)	39.2 (16.3)	36.2 (14.7)	.529
Sex	8 Male, 12 Female	13 male, 7 female	.113
Educational Qualifications	6 None	6 None	
	1 Secondary school	5 Secondary School	
	10 Further Education	7 Further Education	
	3 Higher Education	2 Higher Education	.334
PANSS Scores			
Positive symptoms	12.4 (2.7)	17.5 (5.9)	.000
Negative symptoms	7.4 (0.9)	17.2 (7.1)	.000
General psychopathology	20.6 (4.9)	35.6 (9.7)	.000
Hallucinations	4.2 (0.8)	4.7 (1.4)	.063
Delusions	1.5 (0.8)	3.0 (1.8)	.004
Suspiciousness	1.7 (0.9)	3.5 (1.0)	.000
Anxiety	2.4 (1.8)	3.7 (1.6)	.063
Depression	2.1 (1.6)	3.0 (2.1)	.253
	1		

Table 6.1: Group differences in Demographic variables

Means (and SDs) reported where appropriate, significant results highlighted in bold.

There were no significant differences between the two groups in terms of their ages, sex distribution or level of education. As would be expected, the patient group had significantly more mental health problems according to the PANSS, in all three PANSS subscales of positive, negative and general symptoms. Inspection of

individual items of these subscales revealed that there were no significant differences on hallucinations (both groups had moderate hallucinations) or on anxiety or depression, respectively (where both groups had minimal to mild symptoms). However there were significant differences between the two groups on the respective positive symptom subscales of delusions and suspiciousness. These were rated as mild to moderate in the clinical sample but absent to minimal in the non-clinical sample.

6.4 Between groups analysis of AVH phenomenology

Group differences on the PSYRATS measure of characteristics of AVH were calculated using the Mann-Whitney U test.

	Non-clinical (n=20)	Clinical (n=20)	Sig.
PSYRATS			
Frequency	9 < daily, 11 daily or more	4 < daily, 16 daily or more	.038
Duration	16 < one hour, 4 > one hour	12 < one hour, 8 > one hour	.096
Location	5 inside, 15 outside	4 inside, 16 outside	.904
Loudness	18 quiet, 2 loud	15 quiet, 5 loud	.242
Belief re origin of AVH	6 internal, 14 external	1 internal, 19 external	.429
Amount of negative content	14 none, 4 sometimes, 2 mostly	2 none, 3 sometimes, 15	.000
		mostly	
Degree of negative content	15 none, 5 negative comments,	3 none, 5 negative comments,	.000
	0 threats/commands	12 threats/commands	
Amount of distress	14 none, 5 minority, 1 majority	2 none, 4 minority, 14	.000
		majority	
Intensity of distress	14 none, 6 moderate	2 none, 5 moderate, 13	.000
		extreme	
Disruption	16 none, 4 minimal 0 moderate	1 none, 5 minimal, 14 extreme	.000
Control	6 none, 5 some, 9 mostly	14 none, 3 some, 3 mostly	.013
Total Score	15.3 (4.5)	30.1 (7.4)	.000
Different voices in last	10.6 (15.7)	7.5 (22.0)	.183
week			
First person voices	1.6 (5.7)	5.1 (22.4)	.799
Second person voices	8.2 (15.8)	7.0 (22.1)	.66
Third person voices	0.7 (1.7)	5.8 (22.2)	.429

Table 6.2: Group Differences on PSYRATS-Auditory Hallucination subscale

Means (and SDs) reported where appropriate, significant results highlighted in bold.

The PSYRATS-AH measures characteristics of AVH in the previous week and Table 6.2 details the groups' differences in this measure. There were no significant differences between the groups in terms of the physical characteristics of voices like loudness, location or duration nor were there significant differences in their ratings of whether their voices originated from internal or external sources. There were no significant differences in the number of voices that were heard in the last week, nor differences in the form of these voices i.e. whether they spoke in the first, second or third person. Both groups started hearing voices during late adolescence/early adulthood. There was no significant difference in mean age of non-clinical participants at voices' onset (18.2 years, S.D. = 15.1) and the mean age of clinical participants (20.3 years, S.D. = 12.6).

However, there were strongly significant differences between the two groups on other subscales. Specifically, the clinical group experienced voices more frequently with more frequent and severe negative content. They also felt significantly less in control of their voices and they disrupted their everyday life more. Unsurprisingly, they rated voices as being more often distressing and more intensely distressing.

6.5 Group differences in cognitive variables

Chapter 2 outlined three hypotheses concerning differences between the two groups on cognitive variables. The analyses conducted to test these hypotheses are detailed below.

Beliefs about voices

1. There will not be significant differences between clinical and non-clinical voice-hearers in terms of whether they appraise their voices as originating from internal or external sources.

Table 6.2 supports this hypothesis, demonstrating that there were no significant differences in the two groups' beliefs about whether their AVH originated from internal or external sources.

2. The clinical group will appraise their voices as more malevolent and omnipotent, and less benevolent, than the non-clinical group.

Table 6.3 supports this hypothesis, there were clearly strong statistically differences between the two groups on their beliefs about voices. The clinical group had significantly higher scores on beliefs about malevolence and omnipotence, and also resistance than the non-clinical group. They also had significantly lower scores on beliefs about benevolence and engagement with the voices.

	Non-clinical (n=20)	Clinical (n=20)	Sig.
BAVQ-R			
Malevolence	0.9 (2.0)	11.5 (4.8)	.000
Benevolence	9.7 (4.7)	2.5 (3.4)	.000
Omnipotence	4.6 (2.6)	11.7 (4.5)	.000
Resistance	4.2 (5.2)	16.9 (7.9)	.000
Engagement	4.4 (5.7)	13.2 (6.6)	.000

Table 6.3: Group Differences on Beliefs about Voices Questionnaire (Revised version)

Means (and SDs) reported where appropriate, significant results highlighted in bold.

Beliefs about thinking

3. The clinical group will have higher scores on the MCQ-30 than the nonclinical group.

Table 6.4 supports this hypothesis. The clinical group had significantly higher scores on the MCQ subscales of 'Negative beliefs about worry' and 'Negative beliefs about thoughts, concerning the need for control'.

	Non-clinical (n=20)	Clinical (n=20)	Sig.
MCQ			
Positive beliefs	9.1 (3.9)	8.9 (3.4)	.90
Negative beliefs	10.1 (3.6)	14.6 (5.2)	.003
Cognitive confidence	10.4 (3.9)	13.0 (5.6)	.20
Need for control	9.5 (2.9)	15.2 (4.2)	.000
Cognitive self-consciousness	14.5 (5.0)	14.9 (4.3)	.78
MCQ Total Score	53.6 (13.6)	66.5 (16.3)	.007

Table 6.4: Group differences on MCQ-30 questionnaire

Means (and SDs), significant results highlighted in bold.

6.6 Group differences in environmental variables

Chapters 3 and 4 outlined three hypotheses concerning differences between the two groups on environmental variables. The analyses conducted to test these hypotheses are detailed below.

a) Attachment

4. The clinical group will be more insecurely attached than the non-clinical group.

	Non-clinical (n=20)	Clinical (n=20)	Sig.
Adult Attachment			
Secure	10	2	
Fearful	3	6	
Preoccupied	1	0	
Dismissing	6	12	.025
Attachment anxiety	9.1 (4.4)	11.7 (5.0)	.06
Attachment avoidance	20.0 (6.7)	27.0 (5.7)	.001
Parental Bonding			
Maternal care	22.8 (9.3)	19.8 (9.8)	.289
Maternal overprotection	15.4 (10.3)	14.1 (7.0)	.779
Paternal care 25.3 (8.8)		13.1 (8.2)	.000
Paternal overprotection	12.4 (8.5)	12.3 (8.6)	.929

Table 6.5: Group Differences on Attachment Measures

Means (and SDs) reported where appropriate, significant results highlighted in bold.

Group differences on the adult and child attachment measures are illustrated in Table 6.5. They support the hypothesis that the clinical group will have higher rates of insecure attachment than the non-clinical group. There was a significant difference in attachment categories; the most common category for clinical voice-hearers was 'dismissing' (60%) followed by 'fearful' (30%), both of these attachment categories are characterised by a negative view of others. The most common category for the non-clinical participants was 'secure' (50%), followed by 'dismissing' (30%), both of these categories are characterised by a positive view of self.

Analysis of the dimensional measures of attachment indicated that there were no significant differences between the two groups on model of self (attachment anxiety), although this only marginally missed out on statistical significance (.06) with a trend towards the clinical group scoring higher, thus having a more negative view of themselves than the non-clinical group. There were significant differences between

the two groups on model of others (attachment avoidance), indicating that the clinical group had a significantly more negative view of others than the non-clinical group.

5. The clinical group will rate their parents as less caring and more overprotective than the non-clinical group.

Data in Table 6.5 demonstrates that this hypothesis was partially supported. There were no differences between the two groups in terms of either type of maternal variable or paternal overprotection. However there was a significant difference between the two groups on their ratings of perceived paternal care, demonstrating that the clinical group rated their fathers as significantly less caring than the non-clinical group.

b) Trauma

6. The clinical group will have experienced more trauma (particularly interpersonal trauma such as sexual and physical abuse) and will exhibit more post-traumatic symptomatology than the non-clinical group.

	Non-clinical (n=20)	Clinical (n=20)	Sig.
PDS			
Experienced trauma?	15 yes, 5 no	17 yes, 3 no	.35
No. of lifetime traumas	2.5 (2.4)	3.1 (2.2)	.31
No. of childhood traumas	0.7 (1.0)	1.1 (1.7)	.41
Interpersonal trauma	8 yes, 12 no	15 yes, 5 no	.03
Childhood sexual abuse	3 yes, 17 no	7 yes, 13 no	.14
Childhood physical abuse	3 yes, 17 no	7 yes, 13 no	.14
No. of post-traumatic symptoms	3.9 (4.5)	7.8 (5.6)	.02
Severity of symptoms	5.7 (7.1)	15.8 (14.8)	.02
% meeting criteria for PTSD	3 yes, 17 no	9 yes, 11 no	.04

Table 6.6: Group Differences on the Post Traumatic Diagnostic Scale

Means (and SDs) reported where appropriate, significant results highlighted in bold.

Data from Table 6.6 demonstrates that this hypothesis was partially supported. There were not significantly more people in the clinical group who had experienced trauma in general (nor did they experience significantly more cumulative trauma) but they did report significantly more experience of interpersonal trauma (physical or sexual

abuse). There was a trend for the clinical group to have experienced more childhood sexual and physical abuse but this was non-significant. Although there were not clear significant differences in overall experience of trauma, the two groups differed significantly in terms of post-traumatic symptomatology. The clinical group had significantly more symptoms of PTSD, and these were significantly more severe than those experienced by the non-clinical group. Consequently, significantly more clinical participants met the criteria for diagnosis of PTSD (45%) than non-clinical participants (15%) according to the PDS measure.

6.7 Testing cognitive models

Cognitive models posit that distress associated with AVH can be predicted by cognitive variables such as beliefs about voices and beliefs about thinking. It is thought that beliefs about voices are influenced by negative IWMs of self and others that are derived from early experiences with others. The following hypotheses are proposed:

7. Voice-related distress will be predicted by beliefs about voices.

The PSYRATS subscale 'Amount of Distress' was used in the following analyses to provide a measure of voice-related distress. Multiple linear regression revealed that, together, beliefs about voices explain 83% of the variance in voice-related distress ($F_{3,36} = 56.7$, p <.0001). Collinearity diagnostics were adequate.

	R	R ²	В	SE	В	Т	Sig.
Whole Model	.91	.83					.000
Malevolence			.08	.05	.28	1.6	.127
Omnipotence			.13	.04	.39	3.05	.004
Benevolence			11	.04	35	-2.78	.01

Table 6.7: Multiple linear regression analysis with voice-related distress as the DV and 3 BAVQ IVs

Significant results highlighted in bold

8. Voice-related distress will be predicted by metacognitive beliefs, particularly beliefs about the need to control thoughts, even after controlling for the confounding effect of anxiety.

A hierarchical linear regression was performed with PANSS anxiety score entered in the first block and the five MCQ-30 subscales entered in the second block. The results, detailed in Table 6.8, show that after controlling for anxiety, metacognitive beliefs as a whole significantly predicted voice-related distress and that the only single significant predictor variable was the MCQ subscale 'need for control'. Collinearity diagnostics were adequate.

	R	R ²	В	SE	В	Т	Sig.
Block 1:Anxiety	.41	.16	.39	.14	.41	2.73	.01
Block 2:	.71	.5					
Anxiety			.08	.15	.08	.56	.58
Positive beliefs			.02	.07	.03	.22	.83
Negative beliefs			.06	.06	.18	.99	.33
Cognitive confidence			.00	.05	.01	.05	.96
Need for control			.21	.07	.55	3.14	.004
Cognitive Self-consciousness			11	.06	29	-1.9	.06

Table 6.8: Hierarchical linear regression, with voice-related distress as the DV

Significant results highlighted in bold

9. Insecure attachment will predict voice-related distress, mediated by beliefs about voices.

Mediational analyses are most often guided by the principles laid out by Baron and Kenny (1986) who suggested four conditions that must be satisfied in order to demonstrate that a variable (M) mediates the relationship between an independent variable (X) and a dependent variable (Y). With reference to Figure 6.1, these four steps are: 1) X must predict Y (path c must be significant); 2) X must predict M (path a must be significant); 3) Whilst controlling for X, M must predict Y (path b must be significant) and 4) X no longer predicts Y after controlling for M (path ć is non-significant).



Figure 6.1. A) A direct effect: X affects Y. B) Mediation: X affects Y indirectly through M.

A more statistically rigorous method to test whether the indirect effect of X on Y through M is significant is called the Sobel Test (Sobel, 1982). The Sobel's test (the product of a and b divided by the product of the standard errors of a and b) yields a critical value that can be compared with the critical value from the standard normal distribution appropriate for a given alpha level.

Although Baron and Kenny's (1986) steps are routinely used in psychological research, not all use the more rigorous Sobel (1982) test of the indirect effect. Preacher and Hayes (2004) have criticised both the use of Baron & Kenny's causal steps procedure (e.g. it has low statistical power, it is possible to produce both type I and II errors) and the Sobel test (e.g. it requires large samples and assumes the indirect effect is normally distributed, which it rarely is). They advocate the use of bootstrapping, which is a nonparametric technique and avoids making the assumption that the indirect effect is normally distributed. The bootstrapping method calculates confidence intervals of indirect effects. The indirect effect is judged to be significant if zero does not fall between the 95% confidence intervals. Preacher and Hayes (2004) describe a SPSS macro for estimating indirect effects with the Baron and Kenny approach, the Sobel test and the new bootstrapping method. This macro will be used in the analysis detailed below.

Hypothesis 9 suggests that the relationship between insecure attachment and voicerelated distress will be mediated by beliefs about voices. However, there are not three simple variables within the data but six variables for insecure attachment (attachment anxiety, attachment avoidance, maternal care and overprotection respectively, paternal care and overprotection, respectively) and three variables for beliefs about voices (malevolence, benevolence and omnipotence). In order to decide which variables to put into the macro, correlation analyses were carried out to examine relationships between the possible IV, DV and mediator variables and only the ones with significant relationships were put into the macro.

First, the only attachment variables (IV) that were significantly related to voicerelated distress (DV) were attachment avoidance (r = .46, p < .01) and paternal care (r = .45, p < .01) and so only these two attachment variables will be considered. The second and third requirements of mediation (that the IV must be significantly related to the mediator, and that the mediator must be significantly related to the DV) were tested by series of correlation analyses that are detailed in Table 6.9. This demonstrates that the second and third requirements were fulfilled.

Table 6.9: Correlations between attachment, beliefs about voices and voice-related distress

	Malevolence	Benevolence	Omnipotence
Attachment avoidance	.59**	34*	.49**
Paternal care	41**	.35*	42**
Voice-related distress	.85**	74**	.75**

**= p < .001, * = p < .01, two-tailed.

To test hypothesis 9 (that the relationship between insecure attachment and voice-related distress is mediated by beliefs about voices) Preacher and Hayes (2004) SPSS macro was run three times to test whether each type of belief (malevolence, benevolence and omnipotence) mediated the relationship between attachment avoidance and voice-related distress. It was then run three more times to test whether each type of belief mediated the relationship between attachment distress. The output is described below in Tables 6.10 - 6.15.

Baron an	d Kenn	y's four ste	ps							
		Coefficier	1t	<i>S.E.</i>		Т		Sig	(two-tailed)	
YX (path	c)	.16		.06		2.64 .0		.01	1	
MX (path	a)	.54		.12	1	4.5		.00		
YM.X (p	(M.X (path b) .62			.21		2.9		.01		
YX.M (pa	ath ć)	09		.14	.14		68 .50			
Testing th	he indir	ect effect u	sing Sob	el's test	and Bootstrap	ping				
Effect	SE		Ζ	1	Sig (two-tailed)	2	Lower 95% (CI	Upper 95% CI	
.34	.14 2.4		8	.02	.06			.61		

Table 6.10: Testing whether X (avoidance) indirectly affects Y (distress) through M (malevolence)

Table 6.11: Testing whether X (avoidance) indirectly affects Y (distress) through M (benevolence)

Baron an	d Kenn	y's four ste	ps						
		Coefficier	1t	<i>S.E.</i>		Т	S	Sig (two-tailed)	
YX (path	c)	.16		.06		2.65		.02	
MX (path	a)	26		.12		-2.2		.03	
YM.X (p	YM.X (path b)58			.20		29		01	
YX.M (pa	ath ć)	.14		.10		1.42		16	
Testing t	he indir	ect effect u	sing Sobe	el's test	and Bootstrap	ping			
Effect	SE		Ζ		Sig (two-tailed)		Lower 95% Cl	Upper 95%	CI
.15	.09		1.70		.09		02	.32	

Table 6.12: Testing whether X (avoidance) indirectly affects Y (distress) through M (omnipotence)

Baron an	d Kenn	y's four ste	ps						
	Coefficient		nt –	S.E. 7		T		Sig (two-tailed)	
YX (path	c)	.16		.06		2.65		.02	
MX (path	X (path a) .35			.10		3.44		.001	
YM.X (p	'M.X (path b) .65			.22		2.90		.01	
YX.M (pa	ath ć)	.11		.10		1.0	9	.28	
Testing th	he indir	ect effect u	sing Sobe	el's test	and Bootstrap	pin	g		
Effect	SE		Ζ		Sig (two-tailed)	t i	Lower 95%	CI	Upper 95% CI
.23	.11	11 2.16 .03		.03	.02			.43	

Tables 6.10-6.12 demonstrate that according to Baron and Kenny's method, each type of belief of voices (malevolence, benevolence and omnipotence) is a mediator of the relationship between attachment avoidance and voice-related distress. However, both tests of the significance of the indirect effect (Sobel's and bootstrapping) were only significant for malevolence and omnipotence.

Baron an	d Kenn	y's four st	eps						
		Coefficie	Coefficient		<i>S.E.</i>		T		(two-tailed)
YX (path c) -		11		.05		-2.	.32	.03	
MX (path	a)	26		.10		-2.53 .02			
YM.X (p	ath b)	.53		.19	1	2.7	2.72 .0		
YX.M (pa	th ć)	10		.09		-1	.16	.25	
Testing th	he indir	ect effect i	using Sot	oel's te	est and Boots	trappir	ıg		
Effect	Effect SE Z		Z	Sig (two-i		iled)	Lower 95	5% CI	Upper 95% CI
14	.08		-1.8		.07		29		.01

Table 6.13: Testing whether X (paternal care) indirectly affects Y (distress) through M (malevolence)

Table 6.14: Testing whether X (paternal care) indirectly affects Y (distress) through M (benevolence)

Baron an	d Kenn	y's four ste	ps						
		Coefficier	cient S.E.					Sig (two-tailed)	
YX (path c)11			.05		-2.3		.03		
MX (path	a)	.18		.09	.09 2)	.04	
YM.X (p	'M.X (path b)79			.36		-2.2		.04	
YX.M (pa	ath ć)	12		.09		-1.2	8	.21	
Testing t	he indir	ect effect u	sing Sobe	el's tes	st and Bootstrap	ping	Ş		
Effect	SE Z		Ζ	Sig (two-tailed		led) Lower 95%		CI	Upper 95% CI
15	.10 -1.44		-1.44	.15		34			.05

Table 6.15: Testing whether X (paternal care) indirectly affects Y (distress) through M (omnipotence).

Baron an	d Kenn	y's four ste	ps						
		Coefficier	nt	S.E.		T		Sig (two-tailed)	
YX (path c)11			.05		-2.32		.030		
MX (path	AX (path a)		21			-2.6	. 0	.015	
YM.X (p	'M.X (path b) .59			.22		2.65		013	
YX.M (pa	th ć)	07		.07		97		34	
Testing th	he indir	ect effect us	sing Sobe	el's te	st and Bootstrap	ping			
Effect	SE Z		Ζ		Sig (two-tailed)	ailed) Lower 9		I	Upper 95% CI
12	.07	3	-1.78		.07		26		.01

Tables 6.13-6.15 demonstrate that according to Baron and Kenny's method, each type of beliefs about voices is a mediator of the relationship between paternal care and voice-related distress. However, the more stringent tests (Sobel and bootstrapping) both fail to find significant indirect effects and suggest that beliefs about voices do not mediate the relationship between paternal care and voice-related distress.

Thus Hypothesis 9 was supported, the relationship between insecure attachment (attachment avoidance specifically) and voice-related distress is mediated by beliefs about voices (malevolence and omnipotence specifically). Thus, those who have more negative beliefs about other people are more distressed about their voices because they are more likely to have negative beliefs about their voices also.

10) Trauma will be associated with voice-related distress, mediated by beliefs about voices.

The same analysis was repeated as above but with trauma variables instead of attachment variables. The first step was to run correlational analyses to test which trauma variables (number of life traumas, number of childhood traumas, experience of interpersonal trauma, experience of childhood sexual abuse, experience of childhood physical abuse, number and severity of post-traumatic symptoms) were associated with voice-related distress. Point-biserial coefficients were carried out for dichotomous trauma variables. These analyses were significant only for experience of childhood sexual abuse ($r_{pb} = .41$, p <.01), number of post-traumatic symptoms (r = .33, p <.04) and severity of post-traumatic symptoms (r = .36, p <.02). As number of, and severity of, post-traumatic symptoms were highly positively correlated (r = .90, p <.001), only severity of symptoms was used.

The next step was to check whether the IVs (childhood sexual abuse and severity of post-traumatic symptoms) were significantly related to the mediator variables (beliefs about voices). Table 6.16 demonstrates that childhood sexual abuse was significantly related to beliefs about malevolence and benevolence, and so mediator analyses will be calculated for these potential mediators only. Severity of post-traumatic symptoms was significantly related to the negative beliefs about voices (malevolence and omnipotence) but not beliefs about benevolence. Step three (the mediator variable is significantly related to the DV) was already confirmed in the previous analysis for hypothesis 9.

	Malevolence	Benevolence	Omnipotence
Childhood sexual abuse	33*	38*	.21
Severity of PT symptoms	.45**	27	.43**

Table 6.16: Correlations between trauma, beliefs about voices and voice-related distress

**= p < .001, * = p < .01, two-tailed.

Therefore, to test hypothesis 10 (that the relationship between trauma and voice-related distress is mediated by beliefs about voices) Preacher and Hayes (2004) SPSS macro was run twice to test whether each type of belief (malevolence and benevolence) mediated the relationship between childhood sexual abuse and voice-related distress. It was then run twice to test whether negative beliefs about voices (malevolence and omnipotence) mediated the relationship between severity of post-traumatic symptoms and voice-related distress. The output is described below in Tables 6.17 - 6.20.

Table 6.17: Testing whether X (CSA) indirectly affects Y (distress) through M (malevolence)

Baron and	l Kenn	y's four st	eps						
		Coefficient		S.E.				Sig (two-tailed)	
YX (path c) 2.08			.88		2.36		.02		
MX (path	MX (path a) 4.83			2.2	6	2.14		.04	
YM.X (pa	YM.X (path b) .64			.23		2.8	0	.01	
YX.M (pat	th ć)	3.17		2.0	8	1.5	3	.14	
Testing th	e indir	ect effect i	ising Sol	oel's te	st and Bootstrap	opin	g		
Effect	SE	SE Z			Sig (two-tailed)	iled) Lower 9		CI	Upper 95% CI
3.09	1.89 1.64			.10		61		6.79	

Table 6.18: Testing whether X (CSA) indirectly affects Y (distress) through M (benevolence).

Baron an	d Kenn	y's four ste	ps					
		Coefficient		<i>S.E.</i>		T		g (two-tailed)
YX (path	YX (path c) 2.08			.88		2.36		2
MX (path	X (path a) -4			1.86	5	-2.56		1
YM.X (p	ath b)	57		.18	3	-3.13	.00	03
YX.M (pa	th ć)	.96		1.14	1	.84	.4	1
Testing th	he indir	ect effect us	ing Sobe	el's tes	st and Bootstrap	ping		
Effect	SE	SE Z			Sig (two-tailed)		ower 95% CI	Upper 95% CI
2.70	1.4	0 1.93			.05		05	5.5

Tables 6.17 and 6.18 demonstrate that according to Baron and Kenny's method, each type of belief about voices (malevolence and benevolence) is a mediator of the relationship between childhood sexual abuse and voice-related distress. However, Sobel's test indicates only benevolence is a significant mediator whilst the more stringent bootstrapping method indicates that neither type of belief about voices is a significant mediator.

Baron and Ke	nny's four s	teps							
	Coeffic	Coefficient		S.E.		1	Sig (two-tailed)		
YX (path c) .066		5		.032 2.		.04		4	
MX (path a)	.23	.23			3.11		.004		
YM.X (path b)	.56		.17	2	3.3		.002	1	
YX.M (path ć)	02		.06	9	34		.74		
Testing the ind	lirect effect	using Sob	oel's tes	st and Bootstrap	ping				
Effect S	ect SE Z			Sig (two-tailed)	d) Lower 95%		Ί	Upper 95% CI	
.13 .0)6	2.22		.03		.02		.25	

 Table 6.19: Testing whether X (PT severity) indirectly affects Y (distress) through M (malevolence).

Table 6.20: Testing whether X (PT severity) indirectly affects Y (distress) through M (omnipotence).

Baron an	d Kenn	y's four ste	ps					
		Coefficien	nt	<i>S.E.</i>	T		Sig (two-tailed)	
YX (path	YX (path c) .07			.03	2.09		.04	
MX (path	a)	.18		.06	2.96 .01			
YM.X (p	YM.X (path b) .69			.23	2.9	6	.01	
YX.M (pa	ath ć)	.04		.04	.85		.40	
Testing t	he indir	ect effect us	sing Sobel	's test and Boo	tstrappin	g		
Effect	t SE Z		Ζ	Sig (two-t	ailed)	Lower 95% CI		Upper 95% CI
.12	.06		2.04	.04	.005			.24

Tables 6.19 and 6.20 demonstrate that all three methods of testing the mediation model indicate that the relationship between post-traumatic symptom severity and voice-related distress is mediated by both malevolence and omnipotence.

11) Trauma (especially of an interpersonal nature) will be associated with negative beliefs about voices, mediated by negative IWMs of self and others.

The analysis to test hypothesis 11 followed the same procedure as for the analyses

detailed for hypotheses 9 and 10 above. First, correlational analyses were carried out to examine significant relationships between the IV of trauma variables (variables used were lifetime interpersonal trauma and severity of post-traumatic symptoms), the mediator of negative IWMs (variables of attachment anxiety and avoidance were used as these represent models of self and others, respectively) and the DV of negative beliefs about voices (beliefs about malevolence and omnipotence were used). See table 6.21 for details.

	1	2	3	4	5	6
1.Interpersonal trauma	3 11					
2. Severity of post-traumatic symptoms	.50**	H				
3. Attachment anxiety	.25	.60**	12			
4. Attachment avoidance	.29	.48**	.46**	-		
5. Malevolence	.30	.45**	.36*	.59**	-	
6. Omnipotence	.13	.43**	.3	.49**	.80**	-

Table 6.21: Correlations between trauma, interpersonal schemata and beliefs about voices

**= p < .001, * = p < .01, two-tailed.

According to this table interpersonal trauma is not significantly related to beliefs about voices or interpersonal schemata so there is no relationship to test here. Severity of post-traumatic symptomatology is related to two separate DVs, malevolence and omnipotence. The table suggests that negative IWM of others (avoidance) may be a mediator of the relationship between posttraumatic symptom severity and malevolence and omnipotence respectively. It also suggests that negative IWM of self may mediate the relationship between severity of symptoms and beliefs about malevolence. These mediation models were tested using Preacher and Hayes (2004) SPSS macro and the results are detailed in Tables 6.22-6.24 below.

Baron an	d Kenn	y's four st	eps					
		Coefficient		<i>S.E.</i>		T		(two-tailed)
YX (path c) .23		.23	.23		.08 3		.00	4
MX (path	bath a) .27		.27			3.36	.00	2
YM.X (p	ath b)	.45		.13		3.33	.00	2
YX.M (pa	nth ć)	.11		.08		1.48	.15	
Testing t	he indir	ect effect u	ising Sob	el's test a	nd Bootstrap	oing		
Effect	Effect SE Z		Ζ	Sig (two-taile		iled) Lower 9.		Upper 95% CI
.12	.05		2.31	.0	2	.02		.22

Table 6.22: Testing whether X (PT severity) indirectly affects Y (malevolence) through M (avoidance).

Table 6.23: Testing whether X (PT severity) indirectly affects Y (malevolence) through M (anxiety)

Baron an	d Kenn	y's four ste	ps						
		Coefficient		S.E		Τ		Sig (two-tailed)	
YX (path	(path c) .23			.08		3.11		.004	
MX (path	MX (path a)		3			4.58		.000	
YM.X (p	YM.X (path b) .20			.24		.82		.42	
YX.M (pa	th ć)	.19		.09		2.0	0	.05	
Testing th	ne indir	ect effect us	sing So	bel's te	st and Bootstrap	pin	g		
Effect	SE Z			Sig (two-tailed)	ailed) Lower		CI	Upper 95% CI	
.05	.06		.79		.43		07		.16

Table 6.24: Testing whether X (PT severity) indirectly affects Y (omnipotence) through M (avoidance).

Baron and	d Kenn	y's four st	eps						
		Coefficient		S.E	S.E. T			Sig	(two-tailed)
YX (path c) .18		.06			2.96		.01		
MX (path	MX (path a)		.7 .0			3.36		.002	
YM.X (pa	ath b)	.26		.11		2.3	1	.03	
YX.M (pa	th ć)	.11		.06		1.6	4	.11	
Testing th	indir	ect effect ı	ising Sol	oel's te	st and Bootstraj	ppin	g		
Effect	Effect SE		Ζ		Sig (two-tailed)		Lower 95%	CI	Upper 95% CI
.07	.04		1.85		.06		004		.15

Tables 6.22, 6.23 and 6.24 demonstrate that according to Baron and Kenny's method, the relationship between severity of trauma symptoms and negative beliefs about voices is mediated by negative IWMs of others (avoidance) but the relationship between severity of trauma symptoms and negative beliefs about voices is not mediated by negative IWMs of self. The more stringent tests indicate that negative

beliefs about others mediate the relationship between symptom severity and beliefs about malevolence only.

6.8 Summary

This chapter detailed the quantitative analysis of psychometric measures. It provided a comparison of the phenomenology of AVH in the clinical and non-clinical groups, as well as a comparison of these two groups' beliefs about voices and their thoughts, respectively, and their experience of adverse experiences. It tested the predictions of cognitive models of psychosis, determining whether cognitive variables such as beliefs about thoughts and beliefs about thinking would predict whether voices are experienced as distressing. It also sought to determine whether beliefs about voices are influenced by IWMs of self and others.

The two groups proved to be well matched; there were no significant differences between them on sex, age, or educational history. Both groups were given a psychiatric symptom assessment to check whether the non-clinical group was indeed free of psychological problems. This assessment demonstrated that apart from hallucinations, the non-clinical group did not exhibit clinical levels of any other mental health symptoms. The clinical group scored significantly higher on positive, negative and general symptoms of psychopathology.

Hypotheses 1-3 about group differences on cognitive variables were all supported – the clinical group held more negative beliefs about their voices (and less positive beliefs) and more negative beliefs about their thoughts. There were no significant differences between the groups on whether they believed their voices emanated from internal or external sources.

Hypotheses 4-6 regarding group differences on environmental variables were also supported. The clinical group had more attachment difficulties than the non-clinical group; they were most likely to be rated as 'dismissing', whereas the non-clinical group were mostly 'secure'. The clinical group scored significantly higher on 'attachment avoidance', which indicates that they had more negative views about other people. There was a trend suggesting that the clinical group also had higher scores on 'attachment anxiety' which is a measure of negative views about the self. The only significant difference on perceived parenting was for paternal care; the clinical group rated their fathers as significantly less caring than the non-clinical group. In addition to differences in attachment, there were differences in trauma history, partially supporting hypothesis 6. Although the clinical group did not experience more trauma in general, they did have significantly more experience of interpersonal trauma (physical or sexual abuse). There was also a trend towards them having experienced more childhood sexual and physical abuse, but this was statistically non-significant. There were clear differences between the groups in terms of post-traumatic symptomatology, the clinical group were far more likely to report still feeling traumatised by an event in the past. They had significantly more symptoms (and more severe symptoms) of PTSD than the non-clinical group and consequently were significantly more likely to meet the criteria for PTSD (45% vs 15%) according to the PDS measure.

The main body of the chapter tested hypotheses (7-11) which were derived from recent cognitive models of psychosis. These models state that voice-related distress will be predicted by beliefs about voices and beliefs about thinking (particularly beliefs about the need to control thoughts) respectively, these two hypotheses were both supported by the current analyses. Hypotheses 9 and 10 stated that early adversity (insecure attachment and trauma, respectively) would be associated with voice-related distress and this relationship would be mediated by beliefs about voices. These two hypotheses were supported by the current analysis; those who were insecurely attached (higher levels of attachment avoidance) or who had more severe post-traumatic symptoms were more distressed about their voices, and this effect was mediated through their more negative beliefs about voices. Hypothesis 11 proposed that this association between trauma and beliefs about voices would be mediated by negative IWMs of self and others and this was also partially supported: those who had more severe post-traumatic symptoms were more likely to have more malevolent beliefs about voices and this effect was mediated through their more negative beliefs about other people in general. However, negative IWMs of self (attachment anxiety) did not mediate this relationship.

Chapter 7: Comparing Clinical and Non-Clinical AVH: Study 2: Qualitative Data Analysis

Chapter 1 reviewed the available research comparing clinical and non-clinical voice hearers. Only seven studies have been published in this area, all reporting that clinical AVH tend to be more distressing than non-clinical AVH. The previous chapter described a quantitative study that suggests voice-related distress is predicted by beliefs about voices (which are influenced by past experiences) and beliefs about thoughts, thus supporting recent cognitive models of psychosis. However, psychometric analysis was limited to examining specific cognitive and environmental factors according to the questionnaire measures available. A qualitative method was employed in this study to allow a fuller exploration of the possible cognitive and environmental factors that may be involved in AVH, allowing the voice-hearers to give fuller accounts of their experiences in their own words. The results of this analysis will be discussed in view of psychological models of psychosis in Chapter 9.

7.1 Interpretative Phenomenological Analysis and AVH

There are limitations to the quantitative analyses described in Chapter 6, which may be addressed by adopting a qualitative approach. Firstly, theory driven quantitative measures limit what can be discovered. The previous analysis focused on beliefs about voices, metacognitive beliefs, attachment and trauma but it cannot be assumed that these are the only cognitive and environmental factors involved. The analysis was limited to the psychometric measures available which meant that, for example, cognitive factors were limited to beliefs about voices' intentions and power only and not the wide range of appraisals that are covered by the AANEX interview which was published after data collection began on this project. In addition to incomplete measurement of cognitive and environmental factors, the study did not examine other factors that are suggested to be important by current psychological models of psychosis, for example, social and behavioural factors. It is also possible that there are important factors that are not considered by current theoretical models and these may be elucidated by a more data-driven method. It may be interesting to ask voicehearers what they think distinguishes clinical and non-clinical AVH. It was hoped that a comprehensive interview of each individual covering their life history,

experience of and beliefs about AVHs would yield a fuller picture of the factors involved in distinctions between clinical and non-clinical AVHs.

In addition to limitations in the range of factors that can be studied, quantitative measures are limited in the depth of information that they can elicit and often involve no more than asking respondents to indicate their endorsement of a range of predefined statements. Qualitative analyses allow respondents to give detailed free responses and so provide much richer detail and tap constructs not open to psychometric questionnaires such as what it *feels* like to experience AVH. This would be especially interesting in the case of non-clinical AVH which have not been as thoroughly researched as clinical AVH. Mostly the research literature emphasises distressing voices, this study permits exploration of what it feels like to hear voices that are not distressing, that are perhaps even a positive addition to the experiencer's life.

Asking open questions can also facilitate rapport and encourage fuller disclosure compared to asking a respondent to read a set of statements and tick whether they agree with them or not. It is important to allow people to talk about such a personal, and in some cases very meaningful, experience in their own words. Many of the nonclinical voice-hearers, especially the ones for whom their voices were a spiritual experience, disliked the narrow psychiatric focus of the voices measure, for example, the PSYRATS subscale focuses on distress, disruption and control which some found did not embrace their experiences and reduced them to psychiatric symptoms. Using measures designed for use in clinical populations presumes that AVH are intrinsically related to psychological disorder which is not the viewpoint of this thesis. This thesis aims to take a more fully dimensional view and this involves asking more open, nonpathologising questions to allow participants to explain their experiences from their own perspective.

There are different types of qualitative analysis but the one most appropriate to the aims of this study is Interpretative Phenomenological Analysis (IPA; Smith, 1996). IPA aims to explore the individual's account of an experience, focusing on factors in their life which play a part in determining the meanings that they assign to the experience. However, it also recognises that the account of an individual's experience

will be influenced by the researcher's own conceptions and interpretation hence it is an interpretation of subjectively reported phenomenology. It is able to uncover novel constructs not previously identified by research and it was not designed to test existing theories. Despite this, recently researchers have begun to conduct IPA studies with a theoretical framework in mind, for example, Chin, Hayward and Drinnan (2009) explored voice-hearers' accounts of their relationships with voices in order to explore Birtchnell's theory of relating (1996, 2002).

IPA is mostly used to describe a particular type of experience in a fairly homogenous sample, however the current study seeks to compare the experiences of those with and without a psychiatric diagnosis. Recently, Campbell and Morrison (2007) have published a study with similar aims to the current one. They sought to explore what it feels like to experience paranoia and to compare the experiences of paranoia in clinical and non-clinical groups. They also used existing cognitive models to influence their data collection by focussing on appraisals and trauma. This study will replicate their method and analysis style with voice-hearers. However, this study will devote more space to describing the participants and the phenomenology of their experiences. Campbell and Morrison (2007) concentrated more on discussing their findings in light of recent cognitive models of psychosis, particularly Morrison's (2001) model. Their paper did not give a clear sense of who the participants were and what their experiences of paranoia were like. This may have been achieved by including more excerpts from the interview transcripts.

IPA can produce an enormous amount of data and a complex analysis which is incompatible with the space restrictions for published research, hence the published studies on IPA and psychotic experiences tend to focus more on theoretical interpretation and less on phenomenology of experiences. They have an unbalanced focus on interpretation of findings and rarely include many extracts from interviews, which represents a move away from the founding principles of IPA (Smith, 1996). Although the articles described give a full account of how well their analyses supported their theoretical leanings, it is impossible to get a clear picture of the people who were interviewed. Space constraints are not so restrictive in theses and so this study will aim to give a richer picture of the subjective experience of AVH, especially non-clinical AVH, the phenomenology of which has rarely been reported. This will

be achieved by presenting vignettes of the participants involved and illustrating each theme with supportive extracts where this is informative.

Aims of the study

- To explore the subjective experience of AVH.
- To examine the similarities and differences between the voices, beliefs and life experiences of clinical and non-clinical voice-hearers.

7.2 Method

Participants

All 20 non-clinical and 20 clinical voice-hearers were interviewed using the semistructured interview schedule (detailed in the following section). The most articulate interviewees were chosen from each group, these were voice-hearers who were able to freely discuss their life history, their voices and their beliefs. The number finally selected from each group was limited to six to ensure the analysis was not excessively complicated. In addition to eloquence, participants were selected to ensure that there was a spread of ages, genders and explanatory frameworks. The selected participants will be briefly described here in a series of vignettes. Each participant is identified by a code indicating whether they are a non-clinical (NC) or clinical (C) participant and a number which indicates the order in which they were recruited to the project.

Non-Clinical participants

NC3 was a 63 year old married female teacher, who supplemented her income by working part-time, using her voices, as an animal communicator. She said she couldn't remember ever not hearing voices, describing how she would converse telepathically with animals and with imaginary playmates as a very young child. She said her parents accepted her stories about what the family pets had told her, thinking she was an imaginative child, but became worried when she reached adolescence and was still talking to animals. Her mother had a brief psychotic episode (where she too experienced voices, amongst other symptoms) when NC3 was 12 years old and this prompted her parents to have NC3 assessed by a psychiatrist. NC3 was not told the results of the assessment but chose to keep her voices to herself after that, annoyed that her meaningful experience had been reduced to mental illness. In addition to the voices of animals, NC3 began to see and hear dead spirits in her early fifties and

reported often seeing and hearing deceased relatives, particularly in times of need such as illness. She reported how her once fractious relationship with her mother had been repaired since her mother had passed into the spirit world. NC3 described how voices had been nothing but a positive influence on her life and believed that anyone could hear voices if they developed their sixth sense enough. She did not believe that voices were caused by mental illness or that current psychiatric treatments for voice-hearers were adequate.

NC5 was a 55 year old married female writer. She told how she had been hearing the voices of one woman and two men since early childhood. NC5 said that she did not believe that the voices were real people but products of her creative brain. Nevertheless, she could still visualise them as people and described how they had aged with her over the years. The voices were always benign and spoke to her about mundane topics, sometimes offering her advice or reassurance. She sometimes also heard the voices of her characters when she was writing a novel and they would suggest storylines to her and ask her to change parts of the story that they didn't agree with. She had never thought of the voices as anything spiritual nor pathological. Despite this she chose not to tell anyone about the voices, not even her husband of 30 years, for fear of being labelled mentally ill. She had recently told a close friend about them in confidence, as her friend was writing a novel about a voice-hearer and NC5 felt safe telling her without fear of being negatively judged.

NC6 was a 48 year old single female copywriter and Spiritualist medium and the only non-clinical participant who began to hear voices in adulthood. She had been a personal secretary to a famous medium in her twenties and had some experiences of seeing dead relatives since childhood but did not hear voices until she was 46. She had been planning a new life abroad when her elderly mother had a serious heart attack and she was forced to abandon her plans and become a full time carer. When her mother was still acutely ill in hospital, NC6 began to hear a voice asking her to "Tell Peter he has nothing to blame himself for". This voice became very repetitive and more frequent, always with the same message. Over a number of weeks she became intensely frightened and suicidal, convinced she was having a mental breakdown and visited her GP on several occasions, only to be prescribed anti-

describing a spirit she could see stood next to him, she says he suggested she visit a spiritualist church as he believed that spirit was his dead father. She became involved in the spiritualist church and developed as a medium and now has full control over her voices and has no fear of them. She says that her gift had totally changed her life and made her a much more outgoing and less materialistic person who now spends the majority of her time giving free readings for bereaved people. She wanted to take part in the study as she believed that if she had not seen an open minded doctor she may have been diagnosed with schizophrenia or would have killed herself in despair at what she had believed was an incurable degenerative mental illness.

NC7 was a 21 year old single male psychology undergraduate. He said that he couldn't remember not having voices but had not always identified himself as a voice hearer. He said his experiences seemed to be more like inner speech but recently they had become more malevolent, spoke in the second person and were frequently ego dystonic. He described around seven voices which sounded like his own voice but could be distinguished by distinct intentions or themes, for example, one was always saying inappropriate things, another always said humorous things etc. He was suffering from mild depression since an unexpected relationship break up and said that the content of the voices had grown more malevolent since he was feeling depressed. He was the only non-clinical participant who heard voices commanding him to commit violent acts but said he was appalled by them and would never comply. Despite his frightening experiences, he did not believe his voices were a mental health problem or that they were external entities with malevolent intent. He was adamant that they were the product of his brain and were produced because he had been a lonely child and spent most his time alone, so they entertained him. He had not talked with anyone about his voices before the interview for fear of being labelled mentally ill or people treating him differently. He said he had enjoyed the opportunity to discuss his experiences with someone else and was interested in learning more about voices from the researcher.

Because of the malevolent nature of his voices, and his age, it was a consideration whether he was in the early stages of a psychotic episode. However, he declined to speak with a psychologist when offered, believing he could cope with his voices and said he was happy with the support of a counsellor he was seeing for his depression. He was followed up six months later, when he consented to fMRI study and assessed again for mental health problems. This time he denied feeling depressed, was in a new relationship and said his voices had significantly decreased in frequency and were much more benign. During the hour long fMRI study he only heard one sentence reminding him of a past event whereas he had been bombarded by voices contradicting his thoughts during the interview study six months prior. He was included in the sample as an interesting example of a non-clinical voice-hearer whose experiences were not purely benign or positive and because he favoured a normalising appraisal distinct from the majority of the non-clinical group who favoured spiritual appraisals.

NC9 was a 20 year old female Muslim undergraduate student from Southeast Asia who was studying for a science degree. She was included in the final six as an interesting case of someone with differing religious beliefs and culture from the rest of the sample. NC9 had been hearing the voice of a young girl, who had aged with her, since she was a small child. She described how this girl provided companionship and told her very interesting and detailed stories about her life. NC9 found that she could make clearer contact with the girl if she ran in a stereotyped fashion in her house, describing the dissociative state that it produced. She said that some people had told her parents to get her psychiatric help but they had declined, instead thinking she was a very imaginative and playful girl. Another friend of her mothers had a different viewpoint, believing the girl's voice was NC9's dead twin who had gone to live in another world which was part of local folklore. She kept an open mind to this but wasn't convinced, feeling intuitively that the voice was part of her imagination. She kept her experiences to herself after adolescence for fear of people thinking she was 'weird'. NC9 also began to hear a second voice at the age of 19, a male voice who spoke to her only about death. She had been frightened by the topics he spoke about at first but had grown used to him and did not believe that he meant to scare her, more that he spoke about death because he was a maudlin person. She did not know why she heard voices but believed the man's voice may have been triggered by the trauma of some of her close friends' accidental deaths.

NC11 was a twenty year old male student who was studying for a science degree. He had been hearing voices since he was ten years old. He remembers clearly that they

started off whispering when he was on holiday, he asked his mother what it might be and she brushed it off, telling him to ignore it. The voices became more frequent and clearer and now he believes there are six of them. He could only decipher specific characteristics of three of those, one who sounds like his grandfather, one who sounds like a teenage boy and another who sounds like a motherly woman. The voices talked about mundane things, sometimes offering advice and they had never been unpleasant. He joined a number of student societies that embrace spiritual phenomena and through these developed beliefs that the voices were those of spirits. NC11 said that he felt the voices were there for a purpose but was not sure what that was exactly. He was open about his experiences to his friends, who were mostly supportive but he did not tell family or older people thinking that they would not understand and would presume he was mentally ill.

Clinical participants

C1 was a 42 year old unemployed single man, diagnosed with paranoid schizophrenia and was, at the time of interview, an inpatient at the local psychiatric unit. He had been hearing a male and female voice speaking to him, and about him, since he was around ten years old. Initially the voices had been playful but had turned nastier and repeatedly commanded him to self-harm since the age of 15. Around this time he was having behavioural problems at home and school, was drinking heavily and taking drugs and was thrown out by his mother and stepfather. He described an unhappy childhood, marked by physical abuse and a unhappy adolescence, marred by drug use and criminality. He had a longstanding problem with alcohol and was awaiting referral to an alcohol dependency unit at the time of interview. He described how the voices wanted complete control of his life and his only coping mechanism was excessive drinking. Although he did not believe that the voices were real entities that existed outside of himself he still believed that they were powerful and had seen them and felt them on occasion. They also had an 'army' of banshees that frightened and annoyed him. He had never had a positive experience of voices and said he didn't believe it was possible and that all voice-hearers were mentally ill, although he did not think that he had a mental health problem himself.

C2 was a 57 year old unemployed single male who had been diagnosed with atypical psychosis. He was not taking medication but was under the care of a psychologist.

He was the only clinical participant who had purely benign experiences with voices. He described a single voice that had been present since childhood that advised him and protected him against malign entities from another world that wanted to use him as a portal to enter our world and take it over. C2 described an extremely unhappy childhood, being 'abandoned' by his parents as a baby and brought up by a physically and mentally abusive Grandfather. He said that he had never been happy and felt he was different from other people.

C6 was a 35 year old unemployed male who was diagnosed with psychotic depression and bipolar disorder. He was taking medication and was currently an outpatient though he had previously had three hospital admissions for attempting suicide. He had been hearing voices since the age of 21 which he firmly believed were demons that had accessed his brain because of his heavy drug use during his teenage years. He heard frightening, demeaning and commanding voices daily and found the only thing that helped was to play on his computer games and drink alcohol. He said his mental health problems had scared away friends but he had a good relationship with his girlfriend and mother. Although he was close to his mother, he had never known his father which upset him and did not get on with his stepfather, who had physically abused him. He also told about how he had been a 'bad boy' as a child and had been referred to a psychologist because of his conduct problems.

C8 was a 42 year old married female who ran her own business. She had been hearing voices since childhood and can remember distressing and commanding voices from a young age. She also described periods of dissociation throughout her life and fragmented memories of abuse. After suffering postnatal depression after the birth of her third child she contacted a private therapist and began a three year course of therapy, where her therapist told her he thought she had dissociative identity disorder. Using therapy she developed a cooperative relationship with her voices and identified five benign female voices that were aged between six years old and their early twenties. C8 said she believed these female voices were parts of herself but also perceived them as individuals external to herself. She also heard a negative, frightening male voice and also heard random malevolent disembodied voices. Through therapy she grew to accept the male voice and value him, believing that although the content of what he said was malevolent, his intentions were benign and
to protect her. She did not believe that she would have developed such a good relationship with her voices and maintained a high functioning lifestyle if she had not had private therapy and the supportive understanding of her husband and friends.

C10 was a 32 year old unemployed single male outpatient, who spent a week in a bed support unit every 8 weeks. He had been hearing voices since the age of 23 which always sounded like other people talking to him or about him. His voices often dared him to do things which he often complied with but he was able to resist their violent commands. He believed that he had magical powers, including the ability to hear other people's thoughts and did not accept his diagnosis of schizophrenia. He had spent the majority of his free time since childhood watching videos and cartoons and smoked cannabis daily since adolescence. His voices fuelled a life long belief that the Disney Company had listened in on him playing as a child and used his thoughts to make their cartoons and that he was now entitled to thousands of pounds of royalties. He firmly believed that everyone knew about this and they were being controlled by his mother who was determined that he should not find out.

C17 was a 52 year old single unemployed woman who had been diagnosed with schizophrenia. She was taking neuroleptic medication and was engaging in cognitive behavioural therapy. Her voices had started around the age of 38 years old when she began to believe that she could hear her work colleagues speaking about her. She still heard voices daily, she would hear odd words or phrases as if spoken by a real person in external space and it was hard for her to accept that nobody had spoken sometimes. She was intrigued by the words she heard and spent hours trying to make sense of them, fitting them into long standing beliefs that other people were trying to control her and manipulate her life in a certain direction. She also sometimes heard a female voice, who sounded like an unfamiliar teacher, who would criticise her and NC17 said it felt like she was being watched by this voice. She believed her voices had been caused by stress and described a number of traumatic events in her life including sexual abuse and the unexpected death of her father.

Measure

A semi-structured interview schedule was chosen instead of a structured interview to allow a more flexible, open and less formal approach. Semi-structured interviews have the advantage of facilitating rapport, which would be essential for interviewing groups of voice-hearers, some of whom may never have felt able to talk about their voices before for fear of stigma. This flexibility and informality allows novel areas to be explored but also has disadvantages in that the interviewer has less control and the interviewee may digress into irrelevant topics. More open ended research questions also amass a lot more data than more categorical quantitative measures and can be difficult and time-consuming to analyse.

The interview schedule can be found in Appendix 7, it covers the three main areas of interest in this thesis, namely the individual in the context of their life history, their experiences of voices and the beliefs that they have about their experiences and about hearing voices in general. It was developed under the guidelines of Smith (1995). The three overall areas were considered and a list of short, open questions about each The initial schedule was finalised after suggestions from a area was written. psychologist who was experienced in the field of psychosis and qualitative research. The final interview schedule has a list of areas and open questions were asked from this ad hoc, so that they had a less formal appearance e.g. the interview schedule may simply note 'First experience' and the interviewer would formulate that into an unrehearsed question such as "Can you tell me about the first time you heard voices?" or "What was your first experience of hearing voices like?". There were short prompts on the schedule to help the interviewer ask further questions if the interviewee was not responsive (e.g. 'when?', 'where?', 'positive or negative?', 'did you tell anyone?').

The questions asked also followed the guidelines of Smith (1995) in that they were open-ended and jargon free. It was particularly important with all participants to use neutral words like 'voices' and 'experiences' rather than words like 'auditory hallucinations' and 'delusions' in order to facilitate rapport, trust and to encourage the interviewee to feel that the interviewer took their experiences seriously and was not judgmental. This was important both ethically, and to elicit (as far as is possible) honest, full responses.

Procedure

The interview was the first part of the overall research project that the participants completed and this was intentionally scheduled in this way so that the participant and investigator became acquainted and to build rapport. Every effort was made to make the interview a comfortable, even enjoyable, experience for the participant. They were encouraged to feel in charge of the process; that they were the expert and that the researcher was an interested but naïve pupil. Interviews were conducted where the participants felt most comfortable, but also in areas that were safe for the researcher. All of the non-clinical participants were interviewed in the Psychology department at Bangor University. The clinical participants were interviewed in a range of settings; 7 were inpatients and so were interviewed in an interview room on their ward in the local psychiatric unit. Of the 13 outpatients, 9 were interviewed in the Psychology department of Bangor University and 4 were interviewed in interview rooms within the local community mental health team's office. The researcher and interviewee informally discussed the research project and had refreshments before the interview took place to allow the interviewee to feel comfortable and relaxed before starting to discuss their experiences. It was thought that this would facilitate openness as the interviewees would be asked about personal issues that they may not feel comfortable talking about to anyone, least of all a stranger.

The interviews took around one hour on average but some were as short as 30 minutes, others talked for 150 minutes. The interviews were tape recorded so that the interviewer could concentrate on having a naturalistic conversation without taking notes and that the verbatim transcript could be analysed. Clinical voice hearers tended to talk less, both because they were less articulate and they tired quicker. Some of the non-clinical voice hearers were especially verbose and tended to talk at length about irrelevant topics such as events in their lives unrelated to voices. It is conceivable that the group differences in interviewee style could be due to a range of factors such as differences in IQ, self confidence, experience of talking about themselves and their voices, social skills, co-existent mental health symptoms and distress or neuroleptic medication.

Analysis

The interview transcripts were analysed following the procedures suggested by Smith, Jarman and Osborn (1999). The first transcript was read a number of times and the left margin was used to note anything of interest such as summaries of what was being talked about and preliminary interpretations. The transcript was read again and the right margin was used to note emerging key words or possible themes that attempted to summarise what was being discussed. This process was repeated until a list of possible themes was available for the whole group. The twelve lists of themes were re-read and amalgamated to produce a list of finalised main themes, with corresponding sub-themes. The final list of themes captured the essence of what had been discussed in all interviews. Next, transcripts were read again to ensure that they corresponded to the final list of themes and quotations that illustrated each theme were selected. The list of themes was discussed with a psychologist who was experienced in the field of psychosis and qualitative research and was reviewed iteratively whilst being written up. As Smith et al. (1999) note, there is no clear distinction between an analysis phase and a writing phase in IPA and the current analysis continued and developed during the write up.

7.3 Results

Five main themes emerged from the analysis 1) The individual, 2) The voices, 3) Beliefs about voices, 4) Sequelae of voices and 5) Voice and mental health. Each of these five main themes contained between three and six sub-themes, and a number of these sub-themes had two or three sub-categories. Table 7.1 illustrates the organisation of the themes.

Table 7.1:	The structure	of	themes	that	emerged	from	the IPA
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1) The Individual	2) Voices	3) Beliefs about Voices	4) Sequelae of Voices	5) Voices and Mental Health
a)Quality of Life	<i>a)History</i> -onset -development	a)Cause of Voices -what are they? -why me?	a)Effect on Individual's Life -positive -negative	a)Are Voices Madness?
<i>b)Attachment</i> -child -adult	b)Identity	b)Intentions of Voices	<i>b)Individual's</i> <i>response</i> -engagement -resistance	b)Beliefs about Diagnosis
c)Trauma	c)Content	c)Certainty about Beliefs	c)Coping Strategies	c)Beliefs about Treatment
d)Drug and Alcohol Abuse	d)Topography		<i>d)Disclosure</i> -disclosure -non-disclosure	d)Experiences of Treatment
e)Psychiatric Symptoms	<i>e)Relationship</i> -type of -control -power		e)Others' responses -actual -predicted	
f) Family members with similar experiences -psychotic -paranormal				

Each of these five main themes, and their subsequent sub-themes and sub-categories will now be described, with reference to the original transcripts. Following from Campbell and Morrison's (2007) IPA comparison of paranoia in patients and non-patients, similarities and differences in the two groups' experiences will be highlighted using the letters 'S' for similarities and 'D' for differences. The interviews were transcribed according to conventions where '...' is used to illustrate a pause in speech and '[...]' indicates that a piece of text has been omitted. Non-verbal communication that may be important to make sense of the excerpts is also included in brackets, e.g. [laughs] or [sighs]. Brackets were also used to paraphrase when names were used (to protect confidentiality) and if individuals were referred to by pronouns rather than their name e.g. "and [my sister] says" in place of "and she says".

Theme One: The Individual

a) Quality of life (D)

There was a striking difference between the two groups in terms of their quality of life. The non-clinical group all described active lives with high social and occupational functioning. They each described being satisfied with life, with the exception of NC7 who reported feeling depressed after the unexpected break up of a romantic relationship. In contrast, the clinical group were mainly single, unemployed and shied away from company, preferring to spend their time drinking alone (C1), playing computer games (C6), watching videos (C10), or spending time alone at home (C2 and C17). C8 was the only clinical participant who described a happy family and social life and who was employed.

The two groups were also distinguished by stark differences in their self-esteem. Each clinical participant described feelings of self-loathing or inadequacy e.g. "I've never liked myself" (C1), "I think I'm [sighs] I'm weird... I don't have, I've got no self-esteem, I've got no confidence" (C6) and "I feel a complete failure" (C17). Only one non-clinical participant described such feelings of inadequacy and lack of confidence (NC7).

b) Attachment

i) *Childhood attachment (D and S)*

Both similarities and differences were reported by the two groups in terms of their relationships during childhood. There seemed to be differences in their relationships with their parents; the clinical group had experienced more problematic relationships, involving separation and violence. However, both groups described spending a lot of time alone as children.

(D) Relationship with parents: The non-clinical group, on the whole, described contented and uneventful childhoods, with good relationships with their parents e.g. "We had a normal upbringing and [my parents] were very loving, they spent a lot of time with us" (NC6) and "[There were] a lot more pleasant times than bad times. I didn't have any bad childhood experiences." (NC9). The majority of the non-clinical participants grew up with both parents, with the exception of NC11 whose father left

when he was four and two others (NC5, NC6) said that one of their parents left the family home during their teenage years. Each of these three participants reported accepting the separation and claimed it had not adversely affected them.

In contrast, the clinical group described more problematic relationships with their parents, only C17 was brought up by both her natural parents. Two clinical participants were not brought up by either of their biological parents; C2 was left, as a baby, with his grandparents when his parents emigrated and C8's biological mother was forced to give her up for adoption. They both had difficult relationships with their adoptive care-givers, for example:

C2: "I was abandoned by my parents, before I can even remember and I was brought up by my maternal grandparents erm.. not a very happy place to live, very despotic grandfather, not too bad a grandmother really [...] not the happiest of childhoods."

The remaining half of the clinical group (C1, C6, C10) grew up without their fathers as their parents separated before they had reached school age. Each described how their father had been violent either to them or their mother e.g. "He would hit you and slap you about the place" (C1) and "He was abusing my Mother and he got kicked out by my Uncles" (C6). Each of these participants described how they had never seen their fathers again and how that had affected them deeply as children e.g. C1 said that he isolated himself and stopped talking for a period, C10 also isolated himself in his bedroom, immersing himself in imaginative solo play and cartoon videos. C6 said that he still thought a lot about his father and wanted to know more about him:

C6: "I do think about it a lot [...] "I feel incomplete. I do. Because I look nothing like my Mother and everybody who passes me says "Ooh, you look like your Father". [...] I remember one time we were in [local supermarket], me and my mother, years ago, we were shopping and she goes "Oh, you just passed your father". I was like [sighs] "Oh you could've told me". There's so much I want to ask him."

For two of the three clinical participants whose fathers left when they were small, the caregiving environment did not improve as both C1 and C6 describe their Mother remarrying a man that they did not approve of and how they had responded by being disruptive at home and at school e.g. C6 said "Me and my Stepfather never got on

from day one [...] I used to go out of my way to make his life hell and really upset him, be really naughty, setting the house on fire and stuff, throwing my food around". They also both experienced further physical abuse, C1 from his Grandmother and C6 from his new stepfather.

C1: "[My Grandmother] used to lock me in the cellar [...] and beat me with her walking stick, on the head [...] at the time I thought it was normal but as I grew up and got my own kids, it's nowhere near normal [...] so no, not a good childhood."

In stark contrast to the non-clinical participants, who never mention ever experiencing violence as children, all but two of the clinical participants (C8 and C17) described having experienced or witnessed violence at home. The two clinical participants that did not experience violence, however, did report having experienced sexual abuse as children, and this is documented in the upcoming sub-theme 'trauma'.

(S) Spending time alone as children: The majority of both groups described spending a lot of time alone as children. Some said they chose to distance themselves and preferred to play alone whereas others said they had no choice but to play alone as they were only children or didn't have any friends.

- C1: "I wouldn't play with anyone. I had no friends, I just stayed on my own [...] even though I come from a large family, I was still lonely."
- NC7: "I'd have loads of time by myself and [...] I didn't have any friends because I was bullied [...] so I'd come home from school [...] and then I'd be by myself, have a lot of time to myself."

ii) Adult attachment (D)

Three of the non-clinical group were in a relationship compared to two of the clinical group. The non-clinical group described active social lives and all had daily contact with other people in their occupations. In contrast, the majority of the clinical participants expressed a preference for spending time alone, half the group described themselves as loners who didn't get on with people (C1, C2, C10), e.g. "I [don't] talk to people anyway, I don't like people" (C1). Others spent the majority of their time alone because their mental health problems (including voices and delusions) had scared their friends away (C6) or got worse when in the company of other people

(C17). Most of the clinical participants' main social interaction was with their mother (C1, C6, C10, C17).

c) Trauma (D)

Another major difference between the two groups was the level of trauma that they had experienced in their lives. On the whole, the non-clinical group denied ever experiencing anything traumatic (NC3, NC5, NC7, NC11) e.g. NC3 said "I suppose I've been very, very fortunate through my whole life, my childhood, through the whole of my life [...] there hasn't been anything traumatic at all." Two others (NC6 and NC9) described the experiencing the sudden, untimely death of loved ones on several occasions.

Whereas the non-clinical participants often found it hard to recall upsetting experiences in childhood, every clinical participant was able to recall traumatic incidents when questioned or even said the majority of their childhood was miserable, e.g. "Pretty much everything [was upsetting] I think" (C2). All but one (C17) had experienced some degree of parental separation in childhood and all but two (C8 and C17) reported physical abuse, many of whom could recall clear memories of experiencing or witnessing violence:

C10: "There was a time when my father beat my mother up when I was about four. It's the first memories I've got of when I was a child [...] he got his belt off to her and he, like, whipped her, kind of thing."

The two female participants in the clinical group who did not report physical abuse (C8 and C17) had both experienced sexual abuse as children, which had affected them deeply. C17 said that it had destroyed her self-esteem and made relationships with men difficult. C8 believed that her voices and experiences of dissociation were the result of childhood sexual abuse. Her dissociative defence mechanism meant that she was unable to describe her experiences, due both to a lack of coherent memories and dissociation, she said "I'm not going to be able to talk about because I will just ... freeze"

d) Drug and alcohol abuse (D)

None of the non-clinical group reported abusing drugs or alcohol at any point, although NC7 did admit that he had tried cannabis once but "It had no effect on me". In contrast, all but two of the clinical group (C8, C17) described having taken a wide variety of drugs for many years:

C1: "LSD, speed, everything, everyday."

C2: "I've taken loads of magic mushrooms in the past, loads and loads."

C6: "I was [taking] ecstasy, erm, well into the hundreds, speed, LSD, cocaine, ketamine."

Of the four clinical participants that had an extensive drug history, all but one (C10) said that they had given up drugs many years ago. Despite this history, the clinical participants did not believe that there were links between their drug use and their voices, this was plausible for two of them (C1 and C2) whose voices had started in childhood, long before they had started using drugs. Only C6 believed that his heavy drug use had caused the voices. Most of the group said that they had used alcohol to self-medicate (C1, C2, C6 and C10), this had become problematic in the past for C6: "The only solution I found that worked was alcohol. I picked up a bit of a drink problem." It was currently a problem for C1 who was being referred to a specialist alcohol addiction unit at the time of interview.

e) Other psychiatric symptoms (D)

For the majority of the non-clinical group, hearing voices was the only psychiatric symptom present. Two of them mentioned hallucinations in other modalities, namely visual and somatic hallucinations of dead spirits (NC3, NC6). NC7 described mild symptoms of depression and anxiety, which he linked to the break up of a relationship and he was seeing a university counsellor. The only other unusual experiences described by a non-clinical participant was that of NC9 who described how she would compulsively run in a stereotyped fashion as a child, which produced a dissociative experience where she would hear voices. She stopped doing this as a young teenager, believing it to be unusual, but she continued to hear the voice, albeit less vividly.

In contrast, each clinical participant described experiencing psychiatric symptoms other than hearing voices, the most common being delusions, described by four participants (C2, C6, C10, C17), which were linked to the content of their voices.

C10: "I think that when I was about five years old I was saying things and they had magic powers, yeah, and [the Disney film company] could hear [me talking] and whatever I used to say they used to make television films out of what I used to say."

All clinical participants described symptoms of affective disorders such as depression and anxiety, for example: "I've never been happy" (C2) and "I get dry mouth and I panic" (C6). Two participants had experiences of self-harm (C1, C6) and the same two described having conduct disorder-like problems in childhood, e.g. C6 said "My Mum told me she sent me to see a child psychologist cus I was so bad and they observed me". C8 described dissociative episodes, e.g. "I zoned out [...] it would be quite hard for anybody around to get me to, y'know, come back to reality". C1 described experiencing symptoms of OCD: "there's the counting as well, which is annoying [...] them drawers, one, two, three, four; counting the light fittings, one, two, that goes on. It won't stop either, it just repeats itself"

f) Family Members with Similar Experiences (S)

In the main, the participants were the only ones in their families who heard voices, but three participants did have relatives who were voice-hearers. Two of the non-clinical participants had relatives who were voice-hearers. NC3's mother had two brief psychotic episodes where she was "talking all the time to somebody or something that wasn't there [...] and then, almost as suddenly as it started, it stopped... and life just got back to normal straightaway and nobody talked about it. Nobody discussed it". NC7's maternal grandmother and uncle both committed suicide and she discovered later that they were voice-hearers. She believes they killed themselves because of stigma and "... if only they had been born a generation or so later they'd probably have very different lives."

Only one clinical participant, C1, had family members who also hear voices. He said his mother and brother were both voice-hearers and believe them to be of a spiritual origin, neither has sought treatment for them. Interestingly, they are as dismissive of his experiences as he is of theirs. His mother claims to be attacked by evil spirits but his brother's voices are benign and he believes he has a gift but C1 is sceptical: "I don't think he's gifted, no more than he believes that I hear voices [...] I was always the naughty one [...] that's why they don't believe me, they think it's a scam."

Theme Two: The Voices

<u>A) History</u>

i) Onset (D)

(D) Age: The majority of the non-clinical participants starting hearing voices as children and said that they couldn't remember a time when they had not heard voices, only NC11 was old enough to remember them starting, as a ten year old boy. NC6 was the only non-clinical participant whose voices started in adulthood, suddenly when she was 46 years old. In contrast, half of the clinical group had begun hearing voices in childhood and half were adults when they started (over 21 years old).

(D) Valence: All of the non-clinical group said that the first voices they heard spoke about neutral content for example, mundane conversations with animals or imaginary friends (NC3), everyday topics (NC5, NC9) or hearing neutral messages (NC6, NC7, NC11). In contrast, only two of the clinical group reported that their initial voices were pleasant or playful (C1, C2), the majority of clinical participants first heard voices that were gossiping about them (C8, C17) or were threatening (C6, C8)

C6: "I just heard this voice that said "I'm back" and I looked around, looked behind me to see if anyone was there and he says "There's no need to look behind you" "I'm inside you" he goes "I'm not leaving you this time" [...] It was very sinister."

(D) Emotional Reaction: Perhaps due to the neutral content, the majority of nonclinical participants said that they were not worried by the onset of their voices and felt that it was a normal thing to happen, e.g. "It seemed fairly natural... to have that voice there, y'know, it's almost as if everybody must have this" (NC5). Only two of the non-clinical participants reported feeling worried (NC11) or scared (NC6) by the onset of voices, these were also the only two who could remember the onset of voices. The majority of clinical participants described being frightened by the onset of voices, usually because of the malicious content:

C8: "I must've been about six or seven and praying desperately that this voice would leave me alone "Go away" I didn't want it [...] this voice going "There's no hope for you" "Even if you're perfect, you're still going to suffer" "You're going to pay for it."

ii) Development (S)

For the majority of all participants, the voices they had at onset were very similar to the voices they reported at the time of interview. Those participants who had identified the first onset voice(s) still heard those same voices and those participants whose first voices were anonymous messages, still heard voices in that form. For those who had personified voices, some had grown older over time (NC5, NC9) whereas others had stayed the same age (C1, C8).

On the whole, the original emotion tone of voices had remained the same for participants, two participants reported their originally benign experiences that had become more negative over time (C1 and NC7) and one (NC9) described how she'd begun to hear a new, more negative voice in the past year, in addition to her original benign voice. However, this did not happen in reverse, nobody with negative experiences reported the development of new, positive or benign voices. Participants from both sides described learning more about their individual voices and learning to live with more negative voices over time (NC6, NC9, NC11, C8).

Only three participants reported periods in their lives where their voices had disappeared for a while, for example, NC5 once had a ten day period of silence when she was feeling stressed and was coping by isolating herself from people in her social world also. Two clinical participants lost their voices for more significant periods: C10 lost his voices for two years when he started taking antipsychotic medication and C6 lost his voices for five years once, but this was before he started taking medication and he had no explanation for their absence.

B) Identity (S)

Both groups described their voices as either the real voices of individuals or as just voices, without substance. Half of all the participants said that their voices were those of real people, either of spiritual entities that they could directly speak with (spirits of dead people: NC3, NC6, NC11; demons: C6); real entities that they could communicate with via telepathy (animals: NC3, people: C10) or real people that they could overhear speaking (C17).

The other half of the total group of participants (NC5, NC7, NC9, C1, C8) said clearly that they were hearing disembodied voices, that these weren't real people, and that they heard their voices in almost any situation because they were intrinsically part of themselves e.g. "I don't see anybody attached to these voices, I don't see them as people" (NC5) and "They're not physical forms, they're just [...] voices. That's what they are, voices, and nothing else" (NC7).

Interestingly, even though these participants said that their voices were just voices and nothing more, they still all described them as having characteristics of real people, e.g. C8 said "They've got personalities, characters, ages, I can see them when they speak". They could all describe their voices in terms of their gender, the majority could visualise what they looked like and some had an idea of their age. They all described feeling that the voice was present sometimes when they couldn't hear them talking, even NC7 who was most adamant that they were just voices and not real people described feeling as though his voices " [were] sitting there, watching me". As well as physical qualities, many felt like their voices had psychological attributes like personalities (NC5, NC7, NC9, C1, C8), knowledge (NC5, NC9, C8) or intentions (NC7, NC9, C1, C8).

C) Content (D)

(D) Benign content: One of the main differences between the two groups was in the content of what their voices said, the majority of the non-clinical group heard entirely neutral or positive content, with the exception of two non-clinical participants who also heard voices talking negatively occasionally (NC7, NC9). NC9 heard the voice of a man who talked exclusively about death but she felt this voice belonged to a maudlin character rather than a malicious one. NC7 heard voices with malicious

content similar to that of clinical participants, which will be described later in this section. First, the content of non-clinical participants' voices will be described:

All of the non-clinical participants reported having conversations with the voices about everyday matters or that the voices talked to them about mundane things:

- NC3: "We walked past the end of the stables and I heard this voice say "She's not coming to speak to us" [...] and I knew which [horse] it was that had spoken to me and I just went and said, y'know "Oh, how are you?" and this horse said he was fine and "I'm glad you've come to speak to us. And I said 'Hello' to all the other ones."
- NC9: "She would tell me she has a huge family [...] we used to like very similar stuff and there were some things that I didn't like that she liked but a lot of things were really, we liked similar things."

One non-clinical participant worked as a spiritualist medium and the voices she heard only ever wanted to pass on messages to their loved ones in this world:

NC7: "I get really detailed [messages] [...] I don't get 'Oh, I got this little general, this little man' Everybody knows some little man somewhere. It's like "It's Fred Bloggs, died on January the 8th of a heart attack" and I ask them [...] to give [details] in a particular order and they do. Every solitary time."

In addition to everyday conversation, for some (NC3, NC5, NC11), voices were also supportive, offering advice or reassurance. For example, when NC5 was worrying about whether she had enough money in her main bank account to cover a money transfer, she heard her regular female voice say "Well, what you could actually do is, when you need some more cash, just take it from the other account, couldn't you?". This voice also reassured her when she had difficulties with other people, e.g. "One message that comes over and over again is "They don't mean you any harm, it's just their way of doing things" "They're not out to upset you, if you're upset by that, it's not because they wanted to upset you"".

Benign or positive content was not limited to the voices of non-clinical participants. Some of the clinical participants also reported voices that entertained them (C10), gave them good advice (C2) were good company (C8) or helped them be more creative (C8). Two clinical participants (C10 and C17) heard neutral comments but interpreted these as evidence of a conspiracy against them, possibly in part due to the fact that they were in third person form, e.g. C17 heard "Her only fear is her" and "She'll be out by Christmas" and developed delusions that other people were manipulating her and trying to control her thoughts and behaviour.

(D) Malign content: Despite some neutral and positive content, the vast majority of voices heard by clinical participants were scary or malicious, for two participants this was the only experience of voices they had (C1 and C6). Only one clinical participant had never heard anything negative (C2). Only one non-clinical participant, NC7, reported instances of malicious content.

All but two clinical participants (C2 and C10) described voices that made negative comments about them e.g. "You don't belong here, you belong to us. You're useless [...] you fail everything" (C6) and "You're scum, you should be dead" (C8). NC7 also heard voices that were critical of him:

NC7: "I'll be trying something on and I'll look in the mirror and I think "Oh maybe it's ok" and they'll say to me "Oh you look completely ridiculous in that. You look absurd. Look how skinny you look. If you wear that out, people are going to laugh at you."

C8 described a voice that not only said negative things about her but threatened her, she described how he talks: "[..] a lot about worthlessness, having control over me, can do what he likes with me [...] it's "I've got the power, I'm in control, you can't do anything unless I let you", "you're scum", "you should be dead", "If you try and escape and I'll kill you".

Often, clinical participants described voices that picked on them, this was not reported by any of the non-clinical participants, except for NC7:

- C6: "They were going into overdrive then "He's looking at you" "She's looking at you" "You look out of place [...] they're always picking at me, picky, picky."
- NC7: "They pick up on things that, y'know, I know that I'm insecure about and then they pick up, just like, sometimes they're just picking for the sake of picking."

Some said that voices contradicted their thoughts:

- C8: "Things like "You're making it up" "You're wasting her time" "There are no voices" alternating with the "I told you you'd die if you told anybody about the voices."
- NC7: "I can be thinking something and then it can [be] there going "No, you're wrong, this is how it is" [...] I can be thinking something about myself, like the way I look or the way I'm acting and I can be thinking "No, I think I've done the right thing" and then it's like they can kick in and say "No, you've done this completely wrong, this is what you should be doing."

One clinical participant (C1) said that his two voices argued between themselves: "The man and woman were arguing [the night before the interview] one wanted me to tell you a pack of lies so I could get out of here quicker and the other one wanted me not to say anything at all".

As well as being the subject for their voices, a minority of clinical participants said that they also heard voices talking about other people e.g. "They'd say "You can't trust her" about my mother, "She's out to kill you" (C6).

Commanding voices: All except one clinical participant (C2) had heard voices commanding them to do something. Unlike the non-clinical participants who heard voices advising them to do something benign (except NC7), these voices were telling clinical participants to harm themselves or other people, usually people close to them:

- C10: "I was hearing voices, thinking my roommate was going to kill me and things. I could see him growing fur and the voices were telling me "Kill him before he kills you" [...] The voices were quite persistent saying he was going to kill me and things."
- NC7: "I was just sat there and there was a glass on the table and [...] the sadist one [...] was just saying "Pick up that glass and hit" one of my friends with it and they were [giving him advice about feeling sad recently] [...] and all it was saying repeatedly, repeatedly, repeatedly, was "Pick up that glass and hit her with it."

C10 described how his voices also commanded him to do less violent things, more like dares, for example, he had one voice that dared him to go into the local hotel restaurant and demand that the chefs there cook him a steak. He also said that the voices told him to do things, everyday things, like find a girlfriend but that they threatened him with violent consequences if he didn't do it:

C10: "They were saying for me to get a bird and things and "you're getting old now, you've got to get a girlfriend and settle down or you won't have any children and you won't have a life" and things and they were saying "you'd better get a girlfriend or I'll wipe the floor with you."

D) Topography (S and D)

(S) Frequency: The majority of participants reported hearing voices on a daily basis.

(S) Loudness: The majority of participants reported voices that sounded the same volume or slightly quieter than normal conversation.

(D) Form: All the non-clinical participants reported that their voices were in the second person form, whereas the clinical participants reported a mixture of second and third person voices.

(S) External/Internal: The majority of participants in both groups felt like their voices came from inside their heads and two from each group said they sounded like they were outside of their heads.

(S) Number of voices: There was an equal mix within the two groups of those who heard a small set of well defined voices (2 NCs, 3 Cs), those who heard a handful of ill defined voices (2 NCs, 1C) and those who heard dozens of different voices and could never recognise them (2 NCs, 2 Cs).

E) Relationship with the Voice(s)

i) Type of relationship (D)

All of the non-clinical group described relationships with the voices as pleasant and civil, without power imbalance and like relationships they had with acquaintances. Two said that the voices sometimes offered advice and this felt like they were in a teacher or parent role (NC5, NC11). One clinical participant also described hearing a voice that sounded like a teacher (NC17) but she said that this was because the voice was criticising her. Half of the clinical group reported some kind of power imbalance and felt either subordinate to powerful voices (C1, C6) or that their voice was a wiser mentor (C2). Two also reported that their voices were those of strangers (C10, C17)

and that they did not have a relationship with them. Only C8 reported a collaborative relationship with her voices.

ii) control (D)

(D) initiating/stopping conversation: Half of the non-clinical group said that they had no control over their voices at all. The other half reported some degree of control, two participants (NC3, NC6) said that they had total control over their voices. These three participants, with some degree of control, were also the ones who favoured spiritual explanations.

In contrast, the clinical participants all said that they had no control over their voices. C8 was the exception who had established a co-operative alliance with her voices, describing them as working together as a 'committee'. Due to their cooperation she was able to work without interruption from voices.

- I: "So this afternoon, while you're at work, you'll be able to do your work and not hear anything?"
- C8: "Unless I choose to initiate a conversation and that's because the agreement is work's adult's stuff."
- I: "So you've got quite a bit of"---
- C8: -- "We've got cooperation."
- I: "Yeah, I was going to say 'control' but that's not the word."
- C8: "It's not, no, it's absolutely the wrong word [...] it's cooperation, if I tried to exert control then the system breaks down."

(D) one-way or two-way conversation: Having some level of control over voices seemed to be related to being able to converse with the voices. Those who had no control over voices tended to be the recipients of one-way communication. Half of the non-clinical group had no control and were passive recipients of communication e.g. "I don't talk to them, but they sometimes seem to talk to me as if I've just been talking to them" (NC5). All but one clinical participant (C8) said that they were passive recipients of what their voices said, e.g. C1 said "It's not like a conversation" and C17 said "I just receive cryptic remarks and then I spend ages mulling over them [...] so I can't get at them, I can't answer them back, I can't stop them."

ii) Power (D)

The two groups could be clearly distinguished by their beliefs in the ability of the voices to make them do things. None of the non-clinical group believed voices had the power to make them do anything, e.g. NC3 said "It's people who decide what to do, good or bad, in the world [...] nobody can actually make you do [something] either, whether it's a voice you hear in your head or another person." Perhaps their beliefs were due in part to the fact that they had never experienced commanding voices. Only NC7 had experienced commanding voices but he was adamant that he would never obey them, saying "I've never lost control of it because all of the things that they say are totally ludicrous and I know I would never do [and] I tell them that." The non-clinical group made it clear that the power balance was in their favour, NC11 even spoke about how the voices had to adapt to his stubbornness and accept that they could not influence him, saying "If my mind's made up then that's it, nothing's going to change me and that's it and I think that they've learned [...] to just deal with it."

With the exception of C8, who had established a co-operative alliance with her voices, the clinical group all perceived themselves at the subordinate end of the power balance. Two clinical participants (C1, C6) had complied with their voices' demands that they self harm and another (C10) had complied with the voices' suggestions that he confront people with his suspicions about a conspiracy against him. He was the only one who said he believed the voices had the ability to harm him e.g. "They can curse you, kind of thing, as if they can kill you or make you in pain". Otherwise, there wasn't much evidence that the clinical group thought the voices had complete control, for example, they gave examples of resisting commands that they did not want to obey such as hurting other people (C1, C6, C8, C10) or themselves (C10) and C2 described his voice as offering advice, without any sense of compulsion.

Theme Three: Beliefs about Voices

A) Origin of Voices

i) What are the voices? (S)

There were similar numbers of participants who thought their voices were external and real on one hand, and those who thought they were internal products of their brains on the other hand. The non-clinical group was equally split between those who thought their voices were real entities (spirits: NC3, NC6, NC11, people in this world: NC3) and those who believed that they had been produced by their brain (NC5, NC7, NC9), for example:

NC9: "I just feel that it's probably just my imagination or it's my personality, that it's in my personality that I tend to, I don't know [laughs] yeah, it's not something unusual like from another world or something."

Only two of the clinical participants believed that their voices were products of their brain (C1 and C8), the others firmly believed that they were external entities such as extra-dimensional entities (C2), demons (C6), people of this world communicating via telepathy (C10) or that they could overhear people talking e.g. "I do actually think that it's the person saying it and they're just saying it loud enough so that I can hear it, so I don't feel like I'm reading anybody's mind" (C17).

ii) Why do you have them? (S)

The most common response from both groups of participants was that they didn't really know what had caused them to hear voices, but that they had developed ideas about why this may be so. The clinical group were more certain of the causes of their voices, half of them were convinced of the origin of their voices (C6, C8, C10) compared to only one of the non-clinical participants (NC3).

The non-clinical participants who believed they could hear the voices of dead spirits said that they could do so because they had a special gift (NC3, NC6, NC11). The other three non-clinical participants (NC5, NC7, NC9) believed their voices were the product of their brains and that there was something different, but not wrong, with their brains. NC5 believed she had a creative brain and as a writer perhaps her brain put her thoughts into 'voice format', NC9 thought it could be because she was more imaginative than most people. NC7 said he wondered if his brain had developed voices to entertain him as he'd spend most of his childhood without friends and home alone in his bedroom. NC3 and NC5 also mused whether loneliness was a factor in the development of their voices as both had grown up as only children.

Whilst they had ideas about the origin of their voices, NC7 summed up what most participants said when he said "I don't know, I really don't know. I've never thought of a cause for it or why it is, it's just something I've kind of accepted". He also said that he believed that nobody really knew what caused voices "There's probably a lot of ignorance around it. I mean, even myself [...] because I don't know anything about them or why either me or anyone else hears what they do.".

Some of the non-clinical group believed that voices weren't something unusual but that everybody had the capacity to hear voices and could develop it:

NC3: "[stress and worry] absorbs an awful lot of people's lives, it's no wonder that they can't have access to their sixth sense. Our sixth sense is there but we just get culturally and socially trained not to use it."

The clinical participants were slightly more convinced of the cause of their voices, but there was still a lot of uncertainty. Three of them were sure of the cause of their voices; C6 said his extensive use of drugs had allowed demons to enter his mind, C10 was adamant that he had magic powers and C8 believed voices were her brain's defensive dissociative response to childhood sexual abuse:

- C8: "I think it was something [abuser(s) said] that I've internalised because of the way I've handled life [by] chopping it off into different bits [...] the disembodied voices [...] I'm pretty certain are like echoes of things that I've heard said."
- C8: "[Voice called H], I suppose is what I might call my original 'me', maybe H is what is left of what should have developed into me as an adult but kind of became isolated and it was [...] well, the way that has helped us to move on was it was like she was sealed off from all the stuff that was going on, erm, as a way I suppose to preserve something of sanity."

Half of the clinical participants believed it was something internal, different or special about them (C1, C2, C10), e.g. C1 said "I just thought it was in my head. I don't believe in spirits". The other half of the group believed it was due to environmental factors such as drugs (C6), abuse (C8) or stress (C17).

C17: "I think it was grief... grief and shock [at deaths of beloved dogs] and the fact that I was so tired trying to work all night and I was still trying to stay up a good part of the day, which

does wear you down. So I think I had a lot of things all at once and this is how it, rather than being physically ill, it affected me mentally."

Just two non-clinical participants believed their external environment had caused their voices (NC7, NC9). NC7 believed his brain developed them during his lonely childhood and he believed that anybody could develop voices from normal thought processes after ruminating on trauma:

NC7: "I think that everyone, to a certain degree, whether they have control over them or not probably has these thought processes that, y'know, it's almost like a voice in the head because you go over things and if something serious happens you go over it and over it again, so I think that people think that it's something that it's not."

NC9 thought it was due to trauma after one voice developed after her friends died in separate accidents, all during rainstorms: "I guess it's because, because it didn't happen throughout my whole life, it's that after [four friends of mine] passed away when it rained heavily [...] because of this, I mean, close people around me died".

NC6 said it had been posited to her by other mediums that trauma of her Mother's illness had caused her to be able to hear spirits but she was unconvinced as it hadn't happened during earlier, more upsetting events in her life.

NC6: "The reason what was happening to me is, apparently, it's quite common, I didn't know but a lot of mediums start working out of trauma. They say to you "Are you a trauma medium? And I'd go "What does that mean?" and they say "Did it come on because of trauma?". Now, the doctor said I was stressed when my Mum had the heart attack. I lost my son, didn't happen then. My Dad, who I was very close to [died suddenly], didn't happen then. So I don't know."

Interestingly, not a single participant, including the clinical participants who had been diagnosed with health problems such as schizophrenia and bipolar disorder, said that they believed that their voices were a symptom of mental illness.

B) Intentions of Voices (D)

The non-clinical participants didn't talk in terms of the voices having intentions as such, but half the group believed their voices were those of spirits who wanted to pass messages on to living relatives (NC6), and were sometimes protective or helpful (NC3, NC11). Others said that their voices were generated by their brains and so could not have intentions (NC5, NC7, NC9). However, despite believing that the voices were not real, the two participants who heard more negative voices found it difficult not to interpret them as having intentions (NC7 and NC9). NC7 believed that sometimes his voices enjoyed picking on him, "Just for the sake of picking". NC9 had a male voice that only spoke to her about death and what would happen to her after she died. She had found this voice quite scary at first but was getting used to it and did not believe he had malevolent intentions, rather that he was just a miserable character:

NC9: "He's not trying to scare me but he just [...] he just tells me about death a lot [...] but he doesn't sound bad [...] he doesn't sound like he purposely wants to bother me, the way he sounds is just like a normal conversation and he's not a very happy person."

The clinical group were more likely to talk about their voices as having intentions. Unlike the non-clinical group, two of the clinical participants strongly believed that their voices wanted control over them (C1 and C17). Neither of them had heard voices expressly say that this was their intention but they had deduced it from things they told them to do (C1) or things that they heard being said about them (C17). Because neither participant was able to converse with their voices, they merely received communication, they were unable to ask the voices what they wanted or why they wanted it and this confused and annoyed them e.g. C1: "I'm not sure why they want control over me, it's just one of those things [...] they just want me for themselves [...] I don't understand what they want from me." C1 was particularly confused about the voices' intentions because they were continually commanding him to self harm and had told him to jump out of his top floor window "I can't see the point in that, if they want to stay in my head, why do they want me to jump out of the window? Cus if I'm dead, they're dead."

Two clinical participants believed that their voices wanted to protect them, from malevolent beings (C2) and from remembering her abusive past (C8), respectively. Like NC9, C8 believed that even though the content of what her voice said was malevolent, his intentions were benign:

C8: "One of the [dissociative identity disorder] theories which helped me with managing that voice is the idea that it's actually, that it originates as a protector. It's trying, it's actual job is to try to preserve you, to keep you sane by fighting you off and scaring you off, touching on areas that you might not have been able to handle erm... again."

C) Certainty of Beliefs (D)

All participants had reached a stage where they were somewhat, if not completely, certain of their beliefs about their voices. The non-clinical participants were more likely to be more agnostic and open to interpretations about what their voices might be. They also were more likely to describe how they had considered different viewpoints before coming to their conclusions whereas clinical participants spoke about the cause and source of voices as something certain and concrete, that just was and didn't really explain how they had come to believe that.

NC5 is a good example of a non-clinical participant who described how she had 'tried out' different explanations throughout her life but found none of them fitted her voices. She described how she had wondered at different times in her life if her voices were her conscience or her id, ego and superego or the Virgin Mary or imaginary friends that had extended into adulthood etc. She had settled on the conclusion that voices were parts of her own inner mental world that her brain had put into voice format but she still remained fairly open-minded:

NC5 "I'd say my conclusion, y'know that's come over the years, that I've gradually sort of think its.. they are aspects of my conscience, whatever that is, or my psyche, whatever that is.. probably part of my subconscious [...] it's nothing mystic, it's nothing to do with mental health problems but it's possibly just because [...] I'm an imaginative person, it's just aspects of myself that I'm clothing in [voices] but I just could be wrong, could be wrong [laughs].

Theme Four: Sequelae of Voices

A) Effect on the Individual's Life (D)

i) Positive Effect (D)

There was a striking difference in the two groups' ability to name positive effects of voices on their lives. Every non-clinical participant was able to talk about how they

had found their voices impacted positively on their lives whereas only half of the clinical group were able to do so. Non-clinical participants spoke about how voices provided them with useful advice (NC5, NC11), were enjoyable company (NC9), were good for discussing ideas with (NC5, NC7, NC9) or how they had now improved relationships with dead relatives (NC3). Even NC7 who had the most difficulty with upsetting voices found that, on the whole, they were useful and would not want to be without them:

NC7: "The voices help me [...] and sometimes they tell me things that I need to hear. Other times, I mean, they don't but generally if I'm in a good place, then it's not a burden. I don't see it as, I just see it as [...] the way I am. It kind of, it makes me who I am really cus, without it, I think I'd just be a vegetable. I just think I'd be stood there, I wouldn't know what to do."

Two of the non-clinical participants had been able to use their voices to build new occupations, NC3 worked part-time as an animal communicator and NC6 had become a full-time medium. The most dramatic life change in response to voices was reported by NC6, she was also the only one who began hearing voices in her late forties, as opposed to in childhood. Since becoming a medium she gave up her materialistic life and devoted herself to helping people, free of charge, to get messages from their dead love ones. She described how she was materially worse off but found her spiritual work more rewarding and felt more at ease with life, becoming a happier and more outgoing person.

Half of the clinical group (C1, C6, C17) had never experienced anything positive to do with voices and found it difficult to believe that anybody else could e.g. C1 said "They've never been nice" [...] I think they're naughty, they're not good, I don't think you'd find them very good". The other three were able to think of positive effects of their voices such as that they protected them (C2, C8), gave them advice (C2, C8), helped them to work more efficiently (C8) and entertained them (C10).

ii) Negative Effect (D)

The non-clinical group were far less able to describe negative effects of their voices, two of them denied that there was anything negative about their voices (NC5, NC11). Half of the non-clinical participants could name isolated examples that had worried them at the time either because they were uncontrollable and chaotic (NC3 and NC6) or spoke about death (NC9). They each said that these voices no longer concerned them because they had learned to control them (NC3, NC6) or had grown used to them (NC9). The only non-clinical participant who currently described negative effects of voices was NC7. NC7 described feeling disgusted at the socially inappropriate things some voices would say and how they sometimes made it difficult for him to concentrate and interact socially e.g. "Everything they were saying was really fast and it was like, all over my head, and it was kind of saying different things and I was looking at people and they were talking to me, in real life, but I couldn't understand what they were saying because there was so much going on in my head that I couldn't take it all in".

All of the clinical group, except C2, could describe negative effects of the voices. The others all reported being upset, annoyed or frightened by malevolent voices, which impacted upon their social functioning (C1, C6, C10, C17).

C6: "I don't go out as much erm, that's all to do with psychotic side of things as well but I think I'm [sighs] weird.. I don't have, I've got no self-esteem, I've got no confidence [...] I've lost friends because of this [...] I found out later on it was because I was an embarrassment to them because I was hearing voices and stuff... one particular friend that I was very close with [...] he doesn't want anything to do with me anymore because of this."

and occupational functioning (C1, C6, C10, C17),

C17: "I started shutting the door to my office and I stopped going. I started missing work, I stopped working there a couple of months later [...] I found I was really restricting going out but, I mean, you've got to go out. I won't work now, I won't work with people now because I'm not going to go through that again."

only C8 was able to work and she was able to do so because she was self-employed and had more autonomy. Other negative effects of voices were self-harm due to commanding voices (C1, C6) and impaired self care (C1, C17) due to, for example, voices commanding self-harm whilst shaving (C1) and the feeling of being watched in the shower (C17).

B) Individual's Response to Voices (D)

i) Engagement (D)

All the non-clinical participants described engaging with their voices, they valued them and they felt they were a positive addition to their lives. They could all describe occasions where they engaged with their voices emotionally, and sometimes behaviourally. NC9 described how she would actively seek contact with the voice by entering a dissociative state as a child by running, NC11 described that he was 'working on' being able to have more interactive communications with his voices, by being able to ask them questions. Even NC7 who had the most trouble with his voices said that he valued them in part and couldn't imagine being without them.

The clinical group were less likely to engage with their voices, finding them frightening and disruptive. They were equally split between those who never engaged with their voices (C6 and C17), those who sometimes engaged with their voices (C1 and C10) and those who always engaged with their voices (C2 and C8). C8 described how learning to engage with her voices, even the most scary one, had helped her cope with them, she said "What helped was, I suppose, just accepting that that was there, rather than trying to fight it or shut it off". During the interview, one female voice interrupted her thought processes and complained that she was never listened to, instead of ignoring this voice, C8 said "I should set some time aside to listen to her."

ii) Resistance (D)

On the whole, the non-clinical participants said that their voices didn't upset them or interfere with their daily lives and so they didn't resist them, however they were able to remember examples of times when the voices did impinge on their concentration and they would tell them to leave them alone. This was successful for some (NC3, NC6) but not for others (NC7, NC9, NC11). NC7 was the only non-clinical participant who heard voices commanding him to do things he didn't want to do and he was sure that he would never comply, he said mostly he would disagree with them silently but sometimes he would shout back to them:

NC7: "I can feel myself saying to it "No, I would never do that" [...] if I'm by myself sometimes I'll say it out loud and just be like "Shut up, you don't know what you're talking about" but generally [...] I'll be like, in my head, y'know "I'm just going to ignore you" but they keep going."

The clinical group exhibited far more resistance against their voices. Only C2 said that he had never resisted his voice as he found it extremely useful and benign. The others described instances when they had either emotionally or behaviourally resisted their voices:

- C1: "It's hard sometimes [to resist their violent commands] but I do. I think, cus I've had them that long, I can just listen to them, they annoy me but I can just have another fag."
- C17: "It drives me mad and I'm really irritated because I can't get my own back. I can't answer them back because I don't know who to answer back to so I shout at thin air."

C) Coping Strategies (D)

The concept of coping strategies did not make much sense to many non-clinical participants because they did not find their voices problematic. Half of them had experienced voices that they had found upsetting and had learned to cope by, for example, learning to control them in mediumship development classes (NC6), trying to ignore the voices (NC7) and self-soothing (NC9) e.g. NC9 said "I think I can comfort myself quite well so I find ways to tell myself that I shouldn't worry too much about this voice. But it doesn't go away, it's still there, but I just tend to view it differently"

NC3 did not have problematic voices but she had known people who did and had lots of practical useful advice for dealing with voices, such as normalising and accepting voices, setting limits with them and regaining control:

NC3: "[I've helped] people who hear voices and they've said it's a problem and they don't know what to do about it [...] [I say to them] "Well, it's actually something quite normal it's just that you need to turn your volume down [...] you don't have to do anything that anybody in this life tells you, you don't have to do anything that anybody in some other, y'know, some other vibration around you, whatever it is, tells you to do [...] Just let them know that yes, you do know that they're there and 'No, I'm sorry, I'm rather busy' or 'I prefer not to, however I will refer you to" [...] Imagine you have a secretary that deals with a lot of business on your behalf."

In the clinical group, only C2 had benign voices and did not need any coping strategies, the others demonstrated a mixture of active and passive coping strategies. The majority of clinical participants used passive coping strategies such as using alcohol or drugs (C1, C6), relying on psychiatric medication (C1, C10, C17), blocking them out with loud noise or music (C1, C10), self-harming (C1), withdrawing from other people (C1, C6, C17), trying to ignore the voices (C1, C6, C10, C17). They reported that these techniques were quite successful, for example, C1 says that he evaded voices during his twenties by doing a noisy job and drinking heavily "I ignored them because I used to volunteer for all the noisy jobs [...] jackhammering, very noisy [...] so I did all the noisy ones so banging around all day and I couldn't hear nothing and then straight to the pub after work so couldn't hear nothing then either".

Some employed more active coping strategies such as talking about the voices with other people either within their family (C6, C8) or via membership of mental health charity support groups (C10). Only two clinical participants actively tried to explore their voices and understand the meaning of them, both had been introduced to this concept through psychotherapy (C8, C17). Possibly the most useful coping strategy was exhibited by C8 who had learned, from three years in private therapy and utilising internet help websites, to accept and work with her voices. She described her voices as a committee in her head and described how she would 'check in' with them every day to make sure they all had their needs met and had time to speak. This meant that she could carry on her daily life without unexpected intrusions from the voices.

By accepting and valuing the positive value of her most feared voice, she learned to cope with him and he became less frequent:

C8: "I'm not wedded to the [dissociative identity disorder] theory but it helped in terms of being able to say "Yeah, I value you", "I do value what you you've done" which, in turn, and the combination of just sitting with it and not reacting and the, I suppose, the y'know "You're OK, you're not alone, I value it" happens a lot less often, he's quieter as a voice and not as scary."

D) Disclosure

i) Disclosure (S)

Half of the non-clinical group (NC3, NC6, NC11) were open about their voices and their close family and friends knew about them. They said they would be happy to tell other people about their voices if the subject came up but did not push it on people e.g. NC11 said "I'll tell them if they ask and if they don't, y'know, it's up to them really, isn't it?" These three participants were also the ones who believed that their voices were of a spiritual nature and had found a supportive subculture who endorsed the same beliefs. The other half of the non-clinical group (NC5, NC7 and NC9) said that they didn't talk about their voices, and would be wary of telling people about them for fear of a negative reaction. NC9 had told her parents about her voices as a young child but didn't mention them again after adolescence, NC7 had never told anyone about his voices and NC5 had never told anyone until recently, not even her husband of over thirty years. She recently told a friend, feeling safe to do so because her friend was accepting of unusual experiences and was writing a novel about a girl who hears voices. She was heartened by her friends' positive reaction and said "She was great, y'know, it was really interesting"

Each of the clinical participants had received treatment and a diagnosis and so did not have the same choice over whether to disclose or not disclose about their voices. Some were able to talk to family and friends (C6, C8)

C6: "[My girlfriend's] been brilliant, yeah, she's been really good, yeah [...] my Mum's been reading up about people who hear voices and what medication I'm on, she'll go on the internet and find out what it is and, yeah, she keeps articles in the papers that she sees all about voices and stuff [...] my stepdad's not supportive really, but my family are, they really are, yeah."

Others found that their families did not want to talk about it (C1, C10) or they did not tell their families for fear of upsetting them (C17). Two spoke about how they felt most comfortable talking to other people with mental health problems (C2 and C10).

C2: "I've only told a few people, about three people I've discussed it with. They are people, two of them are failed suicides [...] they're not exactly people you'd call 100%. I can discuss it with people like that, yeah. They've never heard voices or anything but, yeah. [...] I don't go deeply into it, just say that I can hear voices sometimes, I've seen things and things like that."

Some found it useful to talk to mental health professionals (C2, C8, C17) whereas others didn't (C1). C1 said there were a number of reasons that he didn't talk about his voices; that he hadn't realised for a long time that they were unusual; he wasn't very sociable; he didn't think people would believe him and he also believed that he should be more stoic and cope with them alone. He said that he'd volunteered to be interviewed because "Well I was intrigued, to see what it was about because I've never talked about it before, nor my childhood and the things that happened and the early day voices cus I thought it was normal, I thought everybody had them".

C8 said that she had tried to keep her voices secret for years, for fear of peoples' negative reactions to them but she had found it was better to open up so that her family and work colleagues could understand why sometimes she had problems. She also felt it was important as a successful businesswoman and mother that she talked about her difficulties, to reduce the stigma surrounding voices:

C8: "I am [comfortable disclosing to people] now [...] if someone in my position doesn't feel able to be honest about mental health then there's not a lot of hope for the world y'know for changing people's attitudes and stigma [...] the Stephen Fry stuff really helped because [...] it was like watching him do it and he survived. I thought 'OK, we can be [...] a bit less secretive, well, stop being secretive" So, it's not kind of throw it in everybody's face, but not try to keep it a secret either."

ii) Non-disclosure (S)

Only one non-clinical participant was totally happy telling people that he hears voices, NC11 said he would tell people if the conversation ever came up. However, the rest of the group could all describe either hiding their voices in the past or still not feeling totally comfortable telling people about them.

Three of the non-clinical participants had never told anyone about their voices in such detail before the interview and preferred not to talk about them (NC5, NC7, NC9). They were also the participants who favoured internal, rather than external, spiritual explanations of voices. They said the main reason for their non-disclosure was fear that people would think that they had mental health problems and needed treatment:

NC5: "I think it's the sort of thing that you don't tell many people because you're frightened of being labelled as schizophrenic and that sort of thing [...] when I was at primary school, I thought "I'm not going to tell anybody about this because they'll think I'm cracked, y'know, they'll think I'm crazy" [...] and if you do tell somebody they might try to take them away which I really didn't want."

NC7 also said he worried that people might think that he was dangerous "I think that if they knew sometimes what I heard then definitely people would be like "Oh, stay away from him because he could snap or something". Another reason for nondisclosure was fear that others would think that they had made it up for attention (NC7, NC9), for example, NC9 said "I feel that [...] people won't really accept me I guess because they may not, people may think that you're only wanting attention. That's how I feel, that's why I don't go telling people."

They all said that they did not know how people would actually react to them if they disclosed hearing voices but that they didn't want to take the risk e.g. NC9 said "I don't know [if people would react negatively] it could be that they wouldn't but I wouldn't want to try it, I don't trust society that much". They also felt that it was a private experience that did not concern other people so did not need to talk about it, e.g. NC7 said "I never really feel compelled to talk about it.". NC9 described that she felt that it wouldn't help to tell people when she felt upset about what her scary male voice said "because I feel that so what if I tell people? It's not like he's going to stop anyway".

The clinical group described not disclosing about their voices either currently, or in the past, for similar reasons to the non-clinical group. Half of them described not wanting to tell people about their experiences for fear that they would be perceived as mentally ill or be forced into treatment:

- C6: "[The first voice I ever heard] went on for about three months, four months, I didn't tell anyone, I didn't see a doctor, I didn't say a word [...] I was ashamed, I thought I was going mad."
- C8: "I used to be really secretive, I used to be terrified of giving the game away [...] it was a fear of stigma basically, a combination of stigma and people making judgements. [I was particularly concerned] about people making judgements about my fitness for work and my fitness [to look after my] children."

Some believed that other people wouldn't be supportive:

- C1: "If they come and they're severe I can knock on the [nurses' door on the ward] but I feel such an eejit [...] I think that nobody believes me [...] cus I wouldn't believe myself anyway [...] cus it all sounds a bit weird, how a grown man of my age, after being married for twenty years, is ruled by voices in his head. It doesn't make sense."
- C17: "It's not something that my Mum wants to know about [...] She says it's the menopause [...] she said 'It affects people in different ways, y'know, it could go on for years'"

Half of the clinical group expressed some desire to be able to talk more freely about their voices and said it was a lot to deal with alone sometimes:

- C6: "I shoved it into myself [...] it was quite lonely [...] It's quite a burden to carry [...] I just needed a way out quick so I took an overdose."
- C17: "It would be nice to have somebody that you could say to "I've just heard that, tell me it's not in my head."

E) Other People's Response to the Voices (D and S)

i) Actual responses (D)

The non-clinical participants who were open about their experiences (NC3, NC6 and NC11) all had received mixed, but mainly positive responses to their voices. They all believed their voices were spiritual in origin and belonged to subcultures that supported that interpretation and knew other people with similar experiences.

NC3: "I'm really pleased that, when I actually discovered that, a few years ago, that 'animal communication' was something. I didn't even know what the name meant 'animal communication'. I hadn't come across it [...] and came across it purely by chance. People actually want you to do this. Now some people, if I say this is what I do, I amazed at their response and it's s though they all know about it already."

NC11 said that some of his friends were a little bit unnerved by him talking to spirits but the majority of them were fine with it:

NC11: "my friends here [at university], and especially at home, it does tend to.. freak them out a bit [...] my friend J she just, if I start talking to myself then she has to leave because she thinks that I'm going a bit crazy and then [my two other friends] are just like 'Oh, he's talking to himself, the usual""

NC3 and NC6 both used their voices within their occupations (animal communication and mediumship, respectively) and had received some harsh criticism but they maintained that other peoples' negative opinions did not bother them or make them question their beliefs because they believed they were helping people:

- NC3: "How people view things depends on their education, their experience, in other words, where they're looking from. So, I've had all sorts of things, [that] I'm mad, "I'm frightened of you" "You're evil and you can only do it in the name of evil spirits" It doesn't say anything about me or change me."
- NC6: "There are many people who will think I'm crazy, a crank, taking advantage of the vulnerable, abusing and all this kind of thing [...] When I get "Witch", "You're a crank" and "You're weird" I think, 'I don't give a damn what you think' because somehow it's making a difference."

They had also received negative responses from their family. NC3's family indulged her voices when she was a small child but it began to worry them when she reached adolescence and they sent her to a psychiatrist for assessment. NC6's family didn't want her to be a medium at first, she said "It was like "Oh for goodness sake! Why can't you have a normal [life], why couldn't you get married and have kiddies and be normal?" and they weren't at all supportive". However, as they saw the positive effect it had on her life, they became more supportive, she said her brother told her "You've gone all mellow and you're happier than I've ever seen you [...] "If you say you see things and you say you hear things, I believe you [...] [but] I don't understand it."

The clinical participants experienced more negative responses from people, although it was difficult to distinguish whether other peoples' negative reactions were to their voices in isolation or in combination with their other mental health problems such as delusions and self-harm, or their problems with drugs and alcohol. It is also not clear what effect the knowledge of their diagnosis had on other people. The clinical participants were less likely to have contact with other people as their social and occupational functioning was limited and so it is not clear how most people would react to them. Four of the clinical participants were able to discuss their voices with family members, each of them said that they had encountered negative reactions from some family members. They found that relatives did not want to talk about their voices (C10), they didn't believe in their experiences (C1, C8) or that they misunderstood what they were (C1, C10, C17). However, two of them had also experienced more supportive reactions (C6, C8).

Three of the group said that they had friends who knew about their voices, two of them found their friends were interested or supportive (C2, C8) e.g. C8 said "I had two or three friends who I had told about what was going on [...] and the deal was that if I phoned them [...] they'd come straight over so that was kind of a protective thing that was put in place to make sure that there wasn't any risk to [my baby]". However, another participant found that friends deserted him once they found out that he was hearing voices (C6).

ii) Predicted responses (S and D)

Half of the non-clinical participants (NC5, NC7, NC9) and one clinical participant (C17) did not freely discuss their voices with their family and friends and they all believed that there would be negative consequences (see section on non-disclosure). All participants were asked what they thought about the general public's view on voices and they all said that they thought the majority of people would react negatively, believing that voice-hearers are mad or dangerous.

- C2: "Huge majority of people out there, especially those who have no relative or close friend who has experienced it [...] would say nutters, loopy, wackos, off their heads, lock em up, stuff, yeah."
- NC7: "I think, the first thing people would think of if they're uneducated in the, erm, subject, is schizophrenia and erm.. y'know a serial killer who went around killing people because the voices in his head told him to."

However, half of the non-clinical group (NC3, NC7, NC11) believed that the response wouldn't be so categorically negative:

NC7: "I think 30% of the people would be sympathetic and I think about 20% of the people would be intrigued and I think about 50% of the people would be avoiding me."
NC11: "In my experience, it's people are just y'know "Oh, OK" but I think older generations might think "Oh he's gone crazy, he's hearing things."

Theme Five: Voices and Mental Health

A) Are Voices a sign of madness? (S)

None of the non-clinical group believed that their voices were a sign of mental ill health and the thought had only ever occurred to two of them. NC6 said that when her voices started she was terrified that it meant she was becoming insane and would be locked up, but that she now saw them as spiritual in origin. NC7 said that he had never thought of his voices as being a mental health problem in themselves but that had found that they'd become more disruptive since a recent relationship break up and he worried that they might become even more difficult in the future were he to experience a more serious break up.

For the majority of the non-clinical participants, voices had never been problematic for them and they could not imagine them becoming so. For others, namely the three who believed that their voices were spiritual in nature (NC3, NC6, NC11) they spoke about how voices could be problematic (but not a mental health disorder) if the voice-hearer did not understand what voices were and did not have control over them:

NC6: "When you're developed [as a medium] you get your guide in the middle and they protect you so I don't get [nasty spirits coming through] [...] Without that, anyone can come through and especially C, who I told you about, her son [has been diagnosed with schizophrenia]. She believes they're going straight [though] so [...] they have no control who comes through so they get nasty people [speaking to them]."

The clinical group were similar to the non-clinical group in that they too did not believe that their voices were symptomatic of a mental health disorder. This was the case even though they had all been told that they had a mental health problem and they had all accessed treatment. C8 was the exception who said she did think she had a mental health problem, but she also believed that it could be managed and also that it had a positive side. C8: "I think I do have a mental health problem, I suppose in the way that dyslexia is a learning problem. It's two handed because just as with dyslexia you have certain problems and challenges, it also tends to be associated with some real positives around creativity. So I have a mental health problem in that if I don't manage my environment and I don't look after me then I can't function either socially or practically but because I do, because of the therapy and because I do invest time in looking after me, I get the benefits without the disorder side"

Half the clinical group held potentially contradictory beliefs about mental health problems e.g. C1 said that he believed that voice-hearers were all mad but that he was normal:

C1: "Yeah, I think it's a mental health problem, yeah, I think they're nuts [...] They're definitely mental in the head [...] I don't class myself as, I class myself as normal, me"

C6 and C10 both used terms like 'psychosis' and 'delusions' to describe some of the experiences and unusual ideas they had but they did not see their voices as psychotic or delusional, both were adamant that their voices were either demons (C6) or magical powers (C10).

Mostly participants talked about their own voices and did not talk about the experiences of other people, perhaps because the majority said that they did not know anyone else who heard voices. Those that did talk about other voice-hearers, in general, tended to have a negative opinion of them, branding them 'crackpots' (C1) and admitting their were scared of them (NC5, C8):

- NC5: "Other people who admit to hearing voices, I really think they're schizophrenic, they need mental health help [...] and they're probably about to do something dangerous."
- C8: "I've met people who've had external voices [...] and I know it's different because mine are internal rather than external but I found it quite scary and I think the reason I find it scary, I find mental health problems in general scary, certainly the more psychotic side."

The majority of participants spoke about insanity as a definite entity, something that other people suffered from but they did not. Only two participants spoke about madness as being a subjective judgement and that the same person could be judged differently by different people:

- NC3: "This [...] Joan of Arc thing, y'know, OK, eventually they had enough of her and they burnt her but prior to that they had the y'know "Oh, she's mystic and divine" "No she's not, she's very very spooky, let's get rid of her." [...] And that's nothing to do with her, she was never any different, she just heard voices [...] so it's other people's perceptions, people with those abilities don't change but the way they're treated by other people does and it's really interesting that the church has always said "If you're on our side, then you're a mystic and you're saintly" If you've got a slightly different point of view, as a lot of people have had along the way, then "Oh, no, no, sorry, you're working for the other guy""
- C2: "Mental health problems are extremely subjective aren't they? [...] what is mad and what is normal? Some people, the vast majority would [...] say I am mad if I opened up to them, yes. Are people who hear voices mad? They're certainly different, so they don't fit the bill for so-called normality so, by the criteria of this world, they would be mad and mentally ill in that sense, yeah [...] There's certainly something different, yes, wrong? It's extremely undesirable to have, [example of acquaintance who obeyed voices that told him not to eat] but for my own, well the voices are benign and they protect me from evil so I can't see it as a bad thing, am I mentally ill? I don't know, I wouldn't say so but I am fully aware that the people out here, in this world, in the mental health field, would say so, yes."

B) Beliefs about diagnosis

Generally being given a diagnosis was seen as a bad thing though some clinical participants had difficulty articulating why this was so e.g. C17 said she didn't want to have 'schizophrenia', C10 said he felt "labelled, boxed in, pigeonholed" but neither elaborated on why that was a bad thing. Some hinted that it was a bad thing to have a diagnosis because of the reactions of other people; C1 said that his mother was scared of him since he had been diagnosed with paranoid schizophrenia as she thought he would "kill her in her bed". He, himself, said that he didn't believe in the diagnosis and thought that he was normal. C10 also said that he didn't believe in his diagnosis and thought that he had magic powers.

Only two clinical participants could see value in having a diagnosis. C2 said would like to have a diagnosis, saying "At least you know what it is then, or what science says it is [...] might not make it better but at least you know what you're dealing with or what, this world, in scientific terms, said I was dealing with". C8 had not been formally diagnosed but had been advised by a private therapist that her symptoms fitted the profile of Dissociative Identity Disorder. She said that the theories about DID had given her a framework from which to make sense of her experiences and helped her manage them.

C) Beliefs about treatment (D and S)

None of the non-clinical participants had ever sought treatment for their voices and they all said that they never would, even NC7 who admitted he was finding them difficult recently:

NC7: "It's just something I've kind of accepted and very rarely do I get so frustrated that I kind of need some peace from it and would never seek [medical treatment] [and] I would never go to a spiritual [person for help]"

They acknowledged that some people needed treatment as their voices upset them or made them do inappropriate things:

NC3: "Once someone starts doing things that are bizarre because they're taken out of their normal physical role into some other imaginary one that they're living in then there's probably some need for some sort of intervention to start to get them to settle down."

The non-clinical group said that they did not want treatment as they did not want their voices to go away, some of them also had quite negative opinions about treatment believing that it would mean being "stuck on pills" or "locked up" (NC6). NC3 said that she believed psychiatric treatment should be more accepting of voices and teach people to live with them, rather than trying to get rid of them:

NC3: "I think the help that people get is of totally the wrong sort. They're told straightaway "Ooh, you've got a big problem here" Well, no, you've not got a big problem here, you've got an amazing talent or gift that we need to now get under control" [...] The important thing for them is to learn that they are the person who is important and they have to be getting on with their life and whatever these voices are, are secondary, and they need the skills to deal with [them]."

In contrast to the non-clinical participants, the clinical participants had all received treatment of some kind; they had all received psychiatric medication (except C8) and only C2 and C8 were not currently on any medication. Half of them had received psychological therapy (C2, C8, C17).

There was a mixed response to the question of whether they would like treatment to remove their voices. Half of them believed their voices had some function and did not want to lose them (C2, C8, C10), e.g. C8 said "Mmm, if I could take a pill that would get rid of the voices, no, I wouldn't be tempted" and half found their voices uniformly distressing and said that they wanted rid of them (C1, C6, C17). However, C1 did acknowledge that if he lost them completely he would feel "A bit of mixed emotions really cus I've had them for so long, it'd be a bit weird without them but I think it'd be nice.. to have some peace in my ear, finally."

All participants except C8 had received treatment on the NHS. C8 believed that private therapy had helped her find meaning in her voices and helped her to actively live with them. She believed that NHS treatment would have been unsuccessful and damaging:

C8: "I still think that if I had gone to the CMHT [...] I would probably have ended up medicated and on [local psychiatric hospital ward] [...] I would have probably have seen myself with a 'patient' label rather than seeing myself as 'I'm in control of this therapeutic situation' [...] I would have not recovered if I'd gone through the state system."

D) Experiences of treatment (D)

None of the non-clinical participants had experience of treatment for voices, unlike the clinical group who had all experienced treatment of some kind, be it pharmacological or psychological. Two of the non-clinical participants had been to see a doctor to assess their voices and neither was subsequently offered treatment.

When she was 12, NC3's mother suffered a psychotic episode and was cared for at home by the family, she was not taken to the doctor because NC3's father said "they put you in hospital and [...] we can't get you out again". Despite this, after NC3's mother's recovery, they took NC3 to a doctor for assessment as she had been talking about how she spoke with animals since she was a young child. NC3 spoke about her anger at being 'let down' by her parents in this way and her frustrated attempts to get the psychiatrist to understand the voices from her perspective:

NC3: "[I tried to explain] the sort of things that happened to me... and what I heard. But he didn't seem to want to put it into context and he didn't seem to want to know about the fact that it's not just hearing voices, it's actually picking up everything about an animal or a person or something of that sort [...] he was fixated in his own ideas, "Do they ever make you do

something you don't want?" and I can't understand this, I'm thinking "Well, yeah, the dog might say I want to go for a walk now but if I don't want to take it now or if its pouring down with rain, I'd say 'Well, we can't go now, we'll go later' and that's it [...] The thing that baffled me was that he was so intent on switching them off for me and didn't have any understanding that just as I switch them on, I switch them off... but he didn't seem to understand so I thought 'OK, I'd just try and convince him that it's not a problem because I didn't have a problem with it and he kept referring to my 'problems', I didn't have a problem actually."

NC6 went to see her GP when she began to hear voices for the first time aged 46, terrified that she was becoming mentally ill. She saw him several times and said she felt he just brushed it off as stress, giving her medication which she didn't take, not wanting to "be stuck on pills". At the brink of suicide, she visited the surgery again at was seen by a locum doctor who screened her for depression. She described how she had seen a spirit in the consulting room and when she described him for the locum doctor he had been overcome with emotion and told her that the spirit was his dead father. NC6 said that the locum doctor advised her to go to a spiritualist church which completely reassured her and she felt elated that he didn't think she was ill:

NC6: "I'll never forget [the locum doctor], I owe him so much and if he hadn't had such foresight I hate to think how different my life could be [...] I was looking at him thinking "Oh my God, oh my God, oh my God, I'm not ill! I'm not ill!" and it was like, my stomach was churning and everything."

In contrast to the non-clinical group, all of the clinical group (except C8 who had private therapy) had received psychiatric treatment and this had been in the form of medication (C2 and C17 had also received psychological therapy). The majority said that they found medication did quieten the voices but that the side effects could be quite debilitating and they often felt drowsy:

C2: "[My psychiatrist has] given me anti-psychotics [...] I don't take them now, it just clouds everything and masks the stuff, makes you feel less in control and drowsy. The experiences come less often and less strong, yes, but [...] the price isn't worth it, put it that way."

Half of the clinical group (C1, C6, C10) had been inpatients at some time and they all spoke about it as being a negative experience that they did not want to repeat:

C6: "So, yeah, three times, I've been in [hospital] and it's not a pleasant place either [...] I need peace and quiet when I go, it's just too noisy, it's really noisy [...] it's a weird place. How can you get better in an environment like that, y'know? Yeah, I'm not a fan of the place, I'll do anything to stay out of there now, I'll do anything really."

Only two clinical participants spoke about treatment in a positive light. These were two of the participants who had received psychological therapy. C8 said that private therapy had helped her to find meaning in the voices and to live with them. C17 said that cognitive behavioural therapy was helpful in that it gave her someone to talk to about the voices and helped her to make sense of them.

6.4 Summary

The current chapter describes a qualitative analysis of the experiences of non-clinical and clinical voice-hearers using IPA. As noted in the introduction, qualitative methods can produce a large amount of data and a complex analysis and so more space has been taken up by this study than the more quantitative studies described in Chapters 6 and 8. This has been necessary to capture the richness of such an experience as heterogeneous as hearing voices and to describe these experiences in the context of each individual's life history. One of the aims of this study was to return to the founding principles of IPA by providing more of a balance between interpretation and phenomenology, noting that recent published studies have placed more emphasis on interpretation. The current analysis has provided as many interview excerpts as feasible to ground the analysis in the actual data as much as possible. The current chapter has summarised the large data set in terms of five major themes (1: The individual, 2: The voice, 3: Beliefs about Voices, 4: Sequelae of Voices and 5: Voices and mental health). The findings of each of these five themes will be summarised in this section and discussed with reference to current psychological theory in Chapter 9.

The first theme, 'The individual', described the participants as people, within the context of their present and past lives. This theme revealed striking differences between the two groups in terms of their current lives; the clinical group was less happy, less sociable and less active. As well as having little social contact at present, the clinical participants also described unhappy childhoods fraught with difficulties

with caregivers and had experienced more trauma, specifically abuse. In contrast, the non-clinical participants rarely reported having experienced traumatic events. The clinical group more often complained that they did not like themselves or other people, whereas only one non-clinical participant felt that way (NC7). He was also the only non-clinical participant who had distressing voices. As well has having more problematic voices, the clinical group had problems with other psychiatric symptoms such as delusions and self-harm. The majority of them had a long history of drug and alcohol abuse whereas none of the non-clinical group reported ever using drugs. The only similarities between these two groups were that they both reported spending a lot of time alone as children and a few participants from both groups had family members with non-clinical voices and two non-clinical participants had family members with clinical AVH.

The second theme 'The voices' demonstrated that there were a considerable number of similarities between the two groups in terms of the phenomenology of their voices. The topography of voices was similar in both groups; both heard similar numbers of voices, both heard them daily and they were around the same volume as normal conversation. The main difference was in the form of voices; all of the non-clinical group reported second person voices whereas the clinical group's voices were a mixture of second and third person voices. The identity of voices was also similar; both groups contained similar numbers of people who believed that their voices were real entities and those who believed that they were merely products of their own brains. Interestingly, even the participants who believed that their voices were products of their own brains could still describe their voices in terms of being personalities and what they might look like, some even felt like there voices were still present even when they weren't speaking. Even though they did not believe their voices were actual entities, they still ascribed psychological characteristics to them like personality, intention and knowledge.

The two groups could be differentiated in how their voices had started, the content of their voices and the relationships they had with their voices. The non-clinical group's voices mainly started in early childhood, were concerned with mundane topics and rarely provoked emotional reactions. In contrast, the clinical participants were more

able to remember voices starting in adolescence or adulthood and these voices were negative (either because of negative content or negative appraisals of the content) and provoked negative emotional reactions. The content of non-clinical participants' voices was mainly benign, largely based on mundane topics and sometimes involving advice and reassurance. In contrast, the clinical participants' voices were largely malicious about the voice-hearer and about other people, they often criticised the voice-hearer, were threatening and commanded them to do things.

There were striking differences between the two groups in terms of relationships with voices, the clinical participants were more likely to report difficult relationships. The clinical group felt there was a power imbalance; they had no control over their voices, they were passive recipients of voices and many had complied with things their voices had told them to do. However, they did not always comply when the commands were to hurt themselves or other people, indicating that they had some choice. Only one clinical participant reported having a collaborative relationship with her voices and she was the only one who had a good quality of life. Non-clinical participants had more equal relationships with their voices, like the relationships they had with acquaintances. They were more likely to report having control over their voices. Half of them said that they could control their voices and these were also the participants who favoured spiritual explanations of their voices and were able to hold two way conversations. In both groups, those who were recipients of voices (rather than those who were able to hold conversations) reported having no control over their voices.

The third theme described 'Beliefs about voices' and revealed that the two groups had similar beliefs in terms of what the voices were and why they had them. There were equal numbers of people in each group who believed voices were those of real, external entities on one hand or that they were produced by their brains on the other hand. Similarly, there was a fairly equal split between those who believed that they had voices because of causes internal to themselves (e.g. a spiritual gift, creative brain etc) and those who believed external, environmental factors had caused them to start hearing voices (e.g. stress, drugs etc). Interestingly, no participant believed that their voices were a symptom of mental illness. Both groups reported being unsure about the cause of their voices but all had developed ideas over time. The non-clinical participants were more open minded about the causes of their voices and described how they had considered different viewpoints whereas the clinical participants were more likely to have only considered one explanation of their voices.

A clear difference between the groups existed in their beliefs about their voices' intentions; the clinical group were far more likely to ascribe intentions to their voices and to believe that the voices had malevolent intent. This may be because the content of their voices was more negative and personal and these voices may be more likely to trigger a search for meaning than the benign, mundane topics more common to the non-clinical participants' voices. The two non-clinical participants who heard negative voices both talked about these voices as having intentions, even though neither participant believed that these voices were real, external entities. Interestingly, and contrary to this explanation, the appraisal of intentions did not always follow on from content, two participants (one from each group) both described hearing voices with negative content but they did not ascribe malevolent intentions to these voices. One (C8) even said that this threatening voice had benevolent intentions and was there to protect her from remembering her abusive past.

Theme four 'Sequelae of Voices' described the after effects of hearing voices, how participants coped, whether they chose to disclose about their experiences and other peoples' reactions to them as voice-hearers. Voices clearly had a more negative effect on the clinical group, they reported being more distressed, had been referred for treatment and had suffered significant declines in social and occupational functioning. The non-clinical group did not report such negative sequelae, all of them were able to report positive effects of voices and two had even started new occupations using their voices. They engaged with their voices and the idea of coping strategies was alien to the majority of the non-clinical participants. The clinical group were more likely to use passive coping strategies such as abusing alcohol or drugs or by relying on psychiatric medication. The most effective strategy was reported by only one participant, who had received private therapy, who described by accepting and valuing her voices she had a much improved relationship with them. Both groups discussed being wary of disclosing to others about their voices and believed that overall, society thought badly of voice-hearers. For those who had disclosed to others about their voices, the clinical group received mainly negative responses whereas the non-clinical group received mainly positive responses from a like-minded peer group

of people with similar anomalous experiences. However, it was impossible to discern whether other people reacted negatively to the clinical participants solely because of their voices or because of their other symptoms, their diagnosis or their other problems such as relationship difficulties or drug use.

The final theme, Theme Five concerned beliefs about 'Voices and Mental Health' and described the participants' beliefs about whether voices represented a mental health problem and what they thought about treatment for voices. None of the participants believed that their own voices were a symptom of a mental illness but some of them did have negative beliefs about other voice-hearers, saying that they were ill and could be dangerous. The majority of participants spoke about madness as a definite entity that other people were afflicted with but they were not, only two participants (one from each group) described how madness was a subjective judgement and the same individual could be judged either as a mystic or as ill, depending on who was judging them.

None of the non-clinical participants had received treatment for their voices (although two had been assessed and were not offered treatment) and none believed that they needed it. This was either because they were not distressed by their voices or that they could control the ones that did distress them. They believed that people only needed treatment if they couldn't cope with their voices or that they made them do inappropriate things. The non-clinical participants had negative opinions of treatment, believing that it would consist of being 'stuck on pills' or being locked up. Two of the non-clinical participants who thought voices were spiritual believed that psychiatric services should take this into account and aim to help people live with their voices and hone their gift rather than focussing on removing them. All of the clinical group had received treatment, for half of them this included psychological therapy alongside medication. There were mixed views on whether a diagnosis was a good thing and whether treatment was helpful. Psychological therapy was deemed to be very acceptable whereas medication received mixed reviews and inpatient treatment was perceived as frightening and disempowering; something to be avoided at all costs.

This qualitative analysis (Study 2) has produced far richer data than the quantitative analysis (Study 1). It has allowed more detailed examination of factors distinguishing clinical and non-clinical AVH than psychometric measures by allowing participants to talk freely rather than being restricted to rating statements on likert scales. Chapter 9 discusses the data further with regards to how it fits with current psychological theories of psychosis and how it corresponds to the other analyses within this thesis. The following chapter examines the biological basis of clinical and non-clinical AVH.

Chapter 8: Comparing Clinical and Non-Clinical AVH: Study 3: fMRI Analysis

The previous chapters have described comparisons of clinical and non-clinical AVH using both quantitative and qualitative psychological methodology. These investigations have necessarily been limited to examining cognitive, environmental and social factors whereas it is also possible that biological factors play a part in determining whether AVH are judged pathological. The current chapter describes an experiment where AVH were investigated using biological methods, namely functional Magnetic Resonance Imaging (fMRI). After a discussion of the existing literature on fMRI studies of AVH, an experiment will be described where seven non-clinical hallucinators and three clinical hallucinators were scanned with fMRI while they were experiencing AVH. This chapter will conclude with a summary of the findings, which will be discussed further in Chapter 9.

8.1 fMRI studies of AVH

A number of studies have been published investigating cerebral activation during AVH using fMRI in the last ten years. All implicate the involvement of the temporal lobes, specifically the middle temporal gyri (MTG) and superior temporal gyri (STG), but there is less of a consensus about the involvement of other brain areas. Dierks, Linden, Jandl, Formisano et al. (1999) scanned three patients diagnosed with paranoid schizophrenia who signalled the presence of AVH whilst in the scanner by pressing a button, which they held down for the duration of the AVH. Their findings showed that AVH were associated with activity in the temporal gyri (superior and middle), Broca's area (known to be involved in speech production), the amygdala, hippocampus (the authors postulate this may indicate emotional and memory processing) and sensorimotor cortex (most likely due to the button pressing). Interestingly, Heschl's gyrus, which is part of the primary auditory cortex (PAC), was activated during AVH and also during an acoustic stimulation (speech and tones, respectively) condition. The authors suggest that as the PAC is not active during inner speech, it may be that aberrant activity in this area during the production of inner speech that produces an experience that feels like a real voice from an external source.

Ait Bentaleb, Beauregard, Liddle and Stip (2002) used a similar button press methodology and also found left PAC activity (plus right temporal cortex activity) during AVH in a single case study. However, two studies by Lennox's research group found temporal activity but failed to find PAC activity either in a single case (Lennox *et al.*, 1999) or in three out of four patients in a group analysis (Lennox *et al.*, 2000). Also, these three subsequent studies (Ait Bentaleb *et al.*, 2002; Lennox *et al.*, 1999; and Lennox *et al.*, 2000) failed to replicate the language area (Broca's area) activation found in Dierks *et al.* (1999).

One criticism of these studies is that they all employ small sample sizes (all four or less participants). One recent study has studied AVH in a significantly larger study involving twenty four patients with schizophrenia (Sommer, Diederen, Blom, Willems et al., 2008). Group analysis revealed that most activity was found in the right inferior frontal area (including the homologue of Broca's area), the right STG, the left insula and bilateral supramarginal gyri. In contrast to Dierks et al.'s (1999) findings, no activation was found in Broca's area or the left STG. As would be expected, the group analysis of data from a separate letter fluency task demonstrated that language was left lateralised. These findings support the suggestion that AVH may arise from the right hemisphere (Olin, 1999), based on the 'Bicameral Mind' theory of Julian Jaynes (1976) which suggests that historically the left hemisphere has been the site of speech and the right hemisphere the voices of gods (AVH). However, most neuroimaging studies of AVH report the predominance of left hemisphere activation and do not support the theory of a clearly defined role of the left hemisphere in speech and the right hemisphere in hallucinations, respectively (Aleman & Laroi, 2008).

Another interesting component of Sommer *et al.*'s study is that it was the first to attempt to assess associations between cerebral activation measured by fMRI and characteristics of AVH, as measured by the Psychotic Symptom Rating Scale (PSYRATS; Haddock *et al.*, 1999). While the analysis failed to find associations between brain activity and characteristics of voices such as loudness or number of different voices, it did find an association between stronger lateralisation of AVH activity in the right hemisphere and more negative emotional content.

Shergill, Brammer, Williams, Murray *et al.* (2000) suggested that the inconsistent findings between existing studies may be due to problems with their methodology including the use of button pressing to signal AVH, the confounding influence of the scanner noise, small sample sizes and the acquisition of a limited number of images per participant. They developed a new method to counter some of these problems by scanning six patients with schizophrenia at unpredictable intervals and immediately after each scan asking the participants whether they had been experiencing AVH during that scanning period. Findings using this method included a more extensive network of cortical and subcortical areas than had previously been reported; activity was reported during AVH in the frontal and temporal areas, the posterior parietal cortex, thalamus, inferior colliculus, anterior cingulate gyrus, left hippocampus and parahippocampal gyrus. Just like Dierks *et al.* (1999) before them, Shergill *et al.* found increased activity in Broca's area during AVH but did not corroborate their predecessors' finding of increased activity in the PAC and suggested that PAC activity in other studies may have been due to scanner noise.

A more recent study by van de Ven, Formisano, Röder, Prvulovic *et al.* (2005) also circumvented the need for button-pressing by using a data-driven analysis method, called spatial independent component analysis (SICA), which does not require the participant to self-report AVH. The authors reported PAC activity (including Heschl's gyrus) in three of their six participants, suggesting that not all AVH activate the PAC. It may be that only very vivid AVH activate the PAC. An interesting finding of this study was that the detection of PAC activity was related to the length of AVH, thus it may be that the PAC only becomes activated during longer AVH or that fMRI is only able to detect its activity given long enough AVH periods.

While the previous studies have all investigated AVH in clinical participants diagnosed with schizophrenia, who are receiving pharmacological treatment, no study has yet scanned the AVH of non-clinical hallucinators. However, one study has scanned eight non-clinical participants who were deemed to be highly prone to hallucinations on the basis of high scores on the Launay-Slade Hallucination Scale (LSHS; Launay & Slade, 1981) and the Oxford Liverpool Inventory of Feelings and Expeirences (O-LIFE; Mason *et al.*, 1995), as well as having produced a high number of false alarm responses on a signal detection task (Barkus, Stirling, Hopkins, McKie

et al., 2007). The signal detection task was repeated while the participants were being scanned and the activity present during false alarms minus the activity present during correct rejections was taken to represent the areas active during hallucination-like phenomena. These areas were the right MTG, bilateral fusiform gyrus and the right putamen. Barkus *et al.* conclude that their findings suggest that non-clinical AVH are mediated by similar patterns of cerebral activation as found in studies of AVH in patients with schizophrenia. However, this conclusion may be overstating the case somewhat seeing as the major language and auditory areas suggested by patient studies were not activated and the non-clinical hallucinations in this study were false perceptions of single words in ambiguous circumstances and thus may not be an adequate model of AVH.

The current study aims to be the first to scan non-clinical AVH and the first to compare these scans with those of clinical voice-hearers. This is an exploratory study and hence there are no fixed hypotheses. However, it is expected that non-clinical AVH will activate similar cerebral areas to clinical AVH, specifically language and auditory areas. Belin, Zatorre, Lafaille, Ahad *et al.* (2000) discovered human voice selective areas bilaterally in the superior temporal sulcus (STS). The current study will use this group's voice area localiser program to locate this voice-selective area in each of the participants and examine whether it is active during AVH. This is also a unique feature of this study as this program has not yet been used in voice-hearers. Although it is expected that language and auditory areas will be similarly activated in clinical and non-clinical groups, it may be that emotion processing areas are more active in clinical AVH.

8.2 Method

Participants

Each of the forty participants (twenty non-clinical and twenty clinical voice-hearers) that agreed to quantitative data study (see Chapters 5 and 6) and the qualitative study (see Chapter 7) were invited to take part in the fMRI study. Eight non-clinical participants consented and completed the scanning protocol, one of these participants' data could not be used as he only heard one brief sentence whilst in the scanner. Eleven clinical voice-hearers consented to a fMRI scan although only three viable data sets were created. Of the eight participants who did not provide viable data sets

two were scanned but did not hear voices, one moved too much, one could not be scanned because of metal in the body, two started the scanning but aborted early due to anxiety and two did not attend their scanning appointment. The participants that were scanned will be described in more detail below.

a) Non-clinical group

Seven non-clinical voice-hearers without history of psychiatric or neurological illness were scanned (mean age 45, range, 21-63, 2 male, all right-handed, three single). The participants were also assessed with The Positive and Negative Symptom Scale (PANSS; Kay, Fiszbein & Opler, 1987) and their mean scores were 12 for positive symptoms (range 10-14), 7 for negative symptoms (range 7-8) and 18 for general psychopathology (range 16-22). The group's mean score for PANSS Hallucination subscale was 5, indicating that the group's hallucinations were moderate-severe. The mean length of time since onset of hearing voices was 26 years (range 3-58). Five participants described their voices as spirits of people who have died (NC4, NC11, NC12, NC14, NC17), one participant described her voices as the result of telepathy with living creatures (NC3) and the final participant (NC5) did not view her voices as real entities but as a product of her creative brain. No participant was distressed by their experiences and all described neutral conversations with second person voices whilst being scanned.

b) Clinical group

Three clinical participants were scanned, two males (C13, C20) diagnosed with Schizophrenia who were taking antipsychotic medication (one inpatient, one outpatient) and one female (C8) who had been diagnosed with Dissociative Identity Disorder (DID) but was not currently receiving any treatment. Their mean age was 33 (range 20-42) and the mean length of time since onset of AVH was 17 years (range 1-30). The two males diagnosed with schizophrenia were single and the female diagnosed with DID was married. All had at least secondary education and were right-handed.

The participants were assessed with PANSS and their mean subscale scores were 12 for positive symptoms (range 8-15), 11 for negative symptoms (range 7-16) and 27 for general psychopathology (range 18-34). The mean score for the PANSS

Hallucination item was 5, indicating that this group's hallucinations were moderatesevere. The two participants diagnosed with schizophrenia heard exclusively negative and distressing voices, whereas the participant diagnosed with DID reported the majority of voice content was negative but there were also neutral and positive voices. During the scanning the participant diagnosed with DID heard a mixture of excited and scared voices which talked to her about the scanning procedure and a negative voice insulting her. One of the participants diagnosed with schizophrenia (P20) also heard a voice talking about the scanning procedure but he described this as neutral in tone. The other participant diagnosed with schizophrenia heard a single male voice accusing him of incest.

Scanning

All participants were scanned on the Philips 3 Tesla Achieva system at the Brain Imaging Unit of the School of Psychology, Bangor University using a gradient echo EPI (echo-planar imaging) sequence for functional imaging (20 slices of 5mm, no gap, in-plane voxel size 3mmx3mm, slice thickness=5mm, TR=1.5s, TE= 30ms, 220 time points).

Participants were required to listen to a program of different sounds, which was presented using E-prime software package (Psychology Software Tools, Philadelphia, USA) and delivered through the scanner's headphone system at maximum volume. Participants also required to wear ear plugs for protection but still all reported being comfortably able to hear the stimuli even in the presence of scanner noise. The program was obtained from the Voice Neurocognition Laboratory of the Department of Psychology in Glasgow University (http://vnl.psy.gla.ac.uk/resources main.php) and was developed from the work of Belin et al. (2000). Participants heard a combination of different blocks of human non-speech voices (e.g. cries, laughs, whistling, various onomatopoeia from 47 different speakers including babies, children, adults and elderly people) and non-human sounds (e.g. sounds from nature, animals, industrial machinery, musical instruments) which were punctuated by periods of silence. Each block of either non-speech vocal sounds (V), non-human sounds (S) and rest (R) was 15 seconds long and was organised so that each sound block was played 8 times in each run, played in the following order: R SVSV R VSVS R SVSV R VSVS R.

For the second experiment, participants were required to report the presence of their AVH by pressing a button with their right hand, once for the onset of voices and once for the offset of voices.

Data Analysis

Data were preprocessed and analysed using the Brainvoyager software (Brain Innovation, Maastricht, Netherlands). The data were preprocessed by correcting for head movement with three dimensional motion correction, removal of linear trends and filtering data temporally (high pass: 3 cycles per run; Gaussian temporal filter with 2.8s Full Width at Half Maximum, FWHM) and spatially (Gaussian filter with 4mm FWHM). Temporal high pass filtering was not applied to runs with fewer than 6 periods of hallucinations in order to preserve signals of interest. Finally, the functional and anatomical data sets were aligned and both transformed into Talairach space, using a 12 point rigid body transformation.

The voice area localiser runs were analysed with a general linear model (GLM) with the predictors "voice stimulus" and "sound stimulus" and the six motion correction parameters. The predictors "voice stimulus" and "sound stimulus" were constructed by convolving boxcar functions assuming the value "1" for the voice or sound blocks and "0" for the remainder of the run with the hemodynamic reference function. The human voice area were identified with the contrast "voice stimulus" vs. "sound stimulus" following the procedure of Belin (2000). Voxels were accepted as significantly activated if they exceeded a criterion threshold of p < .05, corrected for the False Discovery Rate, FDR).

The hallucination runs were analysed with a GLM with the "voice" predictor as effect of interest and the six parameters from the motion correction in Cartesian space as nuisance variables. The voice predictor was constructed by convolving a boxcar function with the value "1" for time points with hallucinations/imagery and "0" for all other time points with a standard two gamma hemodynamic response function.

For the non-clinical group, a whole group analysis was conducted by computing a random effects multi-subject GLM across all 7 participants. The data were

insufficient to repeat this for the patients as only 3 participants were scanned and hence they were analysed as a case series of individuals.

The non-clinical group's data were sufficient to perform a region of interest (ROI) analysis to determine whether areas identified as voice-selective by the voice area localiser program were also active during hallucination periods. Voice area clusters identified by the localiser were used for a group ROI GLM comparing activity during hallucinations against rest. Any differences against baseline were tested with a one-sample t-test.

8.3 Results

The main aim of this study was to compare the two groups in terms of the cerebral activity present during AVH. However, as data were only available for three clinical participants and seven non-clinical participants it was not possible to conduct a between groups statistical analysis and the two groups were analysed separately. The non-clinical group's data were large enough to be analysed as a whole group and the clinical participants' data were analysed as a series of cases. The results from each group will be described below.

a) Non-clinical group

Group analysis of voice area localiser related activity

The GLM analysis revealed that there was bilateral superior temporal sulcus (STS) activity for each participant when human nonspeech voice sounds were present. The location of these clusters is detailed in Figure 8.1 and Table 8.1.

Further analysis was conducted to determine whether these localised voice areas were active during AVH periods. This revealed that there was significant activity in these localised voice areas during periods of AVH (t(13)=2.437, p=.03).



Figure 8.1: Group map for non-clinical participants' activation during the voice-area localiser

	Left Hemisphere			Right Hemisphere		
	X	Y	Z	X	Ŷ	Z
NC3	-47	-29	1	50	-33	4
NC4	-52	-27	-3	56	-21	1
NC5	-53	-32	0	59	-30	-3
NC11	-55	-40	-4	42	-31	6
NC12	-46	-32	-5	42	-37	1
NC14	-45	-35	-3	54	-32	-2
NC17	-52	-30	0	58	-34	1

Table 8.1: Coordinates of human voice area clusters of non-clinical participants

Group analysis of AVH-related activity in non-clinical group

The ROI analysis revealed that the voice-selective areas identified by the voice area localiser program were significantly activated during AVH periods. Next, a whole brain GLM was conducted to test which other brain areas were significantly associated with AVH periods. A network of fronto-temporal-parietal areas were found to be active, which included language areas in the left hemisphere (Broca's area in the left inferior frontal gyrus [IFG] and Wernicke's area in the left planum temporale [PT]) and their right sided homologues. Other significantly activated areas included prefrontal areas, primary motor cortex (associated with the button pressing report), the bilateral cerebellum, the inferior parietal lobules, the thalami and bilateral areas along the STS and beyond the voice-selective ROIs. These results are detailed in Figure 8.2 and Table 8.2 below.



Figure 8.2: Group map for non-clinical participants' cerebral activation during AVH

mm)				
Area	X	Y	Z	
Right hemisphere				
Ant. STS	54/46	-17/ -10	-8/-14	
Middle STS	53	-31	-4	
Post. STS/ PT	58	-45	12	
ТРЈ	57	-45	30	
IPL/ PcG	50	-40	49	
IFG	49	18	9	
MFG	29	45	26	
PreCG	36	-18	51	
Thalamus	16	-12	8	
Left hemisphere				
Ant./middle STS	-47	-27	-1	
Post STS/PT	-47	-45	6	
ТРЈ	-46	-47	30	
IPL/ PcG	-40	-41	46	
PreCG	-41`	-21	49	
PreCS	-34	-7	52	
IFG	-41	16	8	
MFG	-39	23	29	
Thalamus	-9	-19	9	
Across midline				
SMA/pre-SMA	0	6	49	
Cerebellum	6	-58	-18	

Table 8.2 Brain areas and centre of mass coordinates for AVH map (p < .05, cluster level threshold 810 mm^3)

b) Clinical group

As data were only available for three participants it was not possible to combine them into a group analysis and so a series of single case analyses is presented.

Case Series Analysis of Voice Area Localiser Data

The analysis revealed that the voice-selective region of the STS was active during the voice-localiser experiment for all three participants. For C8, both voices and sounds together activated the STS bilaterally, but no clear activation pattern was found for voices only. However, voices in isolation clearly activated the STS in C13 (bilaterally) and the left STS in C20. Individual STS activations are illustrated in Figure 8.3, featuring coronal views of C8 and C13 and a sagittal view of C20. The coordinates of the voice areas are detailed in Table 8.3



Fig 8.3: Cerebral activation during Voice-localiser experiment for three clinical participants

Table 8.3: Human voice area clusters of clinical participants

	Left Hemisphere			Right Hemisphere		
	X	Y	Z	X	Ŷ	Z
C8	-57	-13	-6	55	-15	-5
C13	-52	-24	-1			
C20	-48	-23	0			

Case Series Analysis of AVH Data

Each clinical participant exhibited significant activity in auditory and language areas during AVH compared with at rest.

i) C8

C8 demonstrated bilateral activity in both language (Broca's area in the left IFG) and auditory processing areas (STS) during AVH as Figure 8.4 illustrates:



Figure 8.4: Bilateral IFG and STS activation during AVH in C8.

ii) C13

C13 exhibited activity in both language (Broca's area in left IFG) and auditory areas (Heschl's Gyrus in left STG) and bilateral STS during AVH, see Figure 8.5.



Figure 8.5: Activation in left IFG, left STG and bilaterally in STS during AVH in C13

iii) C20

There was less clear auditory activation in C20's scan (Planum Temporale) with no STS activity visible, there was clear language activity however, with activation in Broca's area (and it's right sided homologue) and the Planum Temporale (Wernicke's Area). See figure 8.6 below.



Figure 8.6: Activation in Bilateral IFG and Left PT during AVH in C20

The coordinates for the brain areas significantly activated during hallucinations are displayed in Table 8.4 below.

Area	X	Y	Z	
P8				
Left IFG	-48	4	5	
Right IFG	48	12	5	
Left STS	-59	-32	11	
Right STS	53	-36	5	
P13				
Left IFG	-53	15	18	
Heschl's Gyrus	-46	-15	5	
Left STS	-53	-37	10	
Right STS	50	-22	1	
P20		/_		
Left PT	-50	-30	24	
Left IFG	-42	22	24	
Right IFG	37	23	24	

Table 8.4: Coordinates for brain areas activated by AVH in clinical participants

8.5 Summary

The current study is the first to report the results of an fMRI analysis of AVH in nonclinical participants. It is also unique in using a voice area localiser program to localise the human voice area in those with AVH, either clinical or non-clinical. The original aim was to compare the cerebral activation during AVH in these two groups but as only three viable data sets were obtained from clinical participants, this was not possible. Instead, a group analysis of the non-clinical participants' data was carried out and the clinical participants' data were reported as a case series.

The results suggest that clinical and non-clinical AVH activate similar frontotemporal areas, particularly language and auditory areas. An area of the STS was localised as the human voice area in both sets of participants, and this was correlated with AVH in the clinical group. A whole brain group analysis was possible for the non-clinical group only and this revealed a network of frontal-temporal-parietal areas including Broca's and Wernicke's areas and their right-sided homologues, prefrontal areas, primary motor cortex, bilateral cerebellum, inferior parietal lobules, the thalami and bilateral areas along the STS (including the voice-selective area). It was suggested that clinical AVH may be associated with more activation in emotional processing areas than the non-clinical AVH. It was not possible to compare the two groups to test this hypothesis but there were no indications in any of the data that emotional processing areas were active during AVH. These data will be discussed in relation to existing research and theory in Chapter 9, along with suggestions for future research.

Chapter 9: Comparing Clinical and Non-Clinical AVH: General Discussion

9.1 Introduction

This thesis concerns the phenomena of AVH with a specific interest in the experiences of voice-hearers who do not report a need for care or distress in relation to their voices. The aims of this thesis were twofold: first, to explore the phenomenology of non-clinical AVH, and second, to examine factors involved in determining whether voice-hearers have a clinical or non-clinical outcome.

With regards to the first aim, there is a dearth of studies examining the phenomenology of non-clinical AVH. Only two recent studies have published data on the dimensions of non-clinical AVH as measured by the PSYRATS, i.e. frequency, location, loudness, degree of negative content etc (Andrew *et al.*, 2008; Sommer *et al.*, 2008). The current thesis repeats this psychometric measure and also provides a qualitative analysis of non-clinical AVH to provide richer information on the subjective experience of voices, within the context of the voice-hearer's life history, akin to previous qualitative investigations of voices by Romme *et al.* (e.g. Romme & Escher, 1989).

With regards to the second aim, the thesis was influenced by current cognitive models of psychosis. These models suggest that it is not the experience of AVH in itself that determines whether an individual comes to the attention of mental health services but rather the appraisals that the individual makes of their AVH. The models differ on the types of appraisal that they specify to be important in determining outcomes for voice-hearers. According to Garety *et al.* (2001; 2007) voices that are appraised as external and personally relevant are defined as psychotic. For Morrison (2001), the psychotic appraisal is defined by being culturally unacceptable. Chadwick and Birchwood (1994) have concentrated on the distress associated with AVH and suggest that this is engendered by appraisals of voices as being powerful and malicious. All models suggest that appraisals have their roots in early experience and so those with non-clinical AVH could be expected to have more negative early experiences such as trauma and problematic relationships with care-givers. An alternative model was also presented which suggests that AVH may arise from an adaptive problem solving process and that non-clinical AVH could be distinguished from clinical AVH by the extent that they resolve crises and are socially validated (Jackson, 2001; 2006). Like the cognitive models, this model posits that early experiences will be important, as they influence the content of the experiences.

The thesis was also informed by previous studies that have compared clinical and non-clinical AVH. There have only been seven such studies published in the last twenty years. (Romme & Escher, 1989; Leudar *et al.*, 1997; Honig *et al.*, 1998; Davies *et al.*, 2001; Johns *et al.*, 2002; Jones *et al.*, 2003; Andrew *et al.*, 2008). Taken as a whole, these studies have demonstrated that the form and pragmatic properties of AVH are similar in both groups but that clinical AVH are more distressing. These studies provide support for cognitive models of psychosis in that the two groups are shown to have different beliefs about voices and these beliefs have been demonstrated to be influenced by trauma (Andrew *et al.*, 2008). There is some indication that social validation may lead to more functional outcomes as suggested by psychological models, for example, one study found that non-clinical voice-hearers were more likely to tell people about their voices and feel supported by others (Romme & Escher, 1989). None of these studies have considered biological differences between clinical and non-clinical voice-hearers.

The current thesis used three distinct methods to examine clinical and non-clinical AVH; quantitative analysis of psychometric data, qualitative analysis of interview transcripts and fMRI analysis of cerebral activation during AVH. It was designed to provide a more detailed description of the phenomenology of non-clinical AVH and to examine possible cognitive, environmental and biological factors that might distinguish clinical and non-clinical AVH. The current chapter summarises the findings of these three studies and discusses them in relation to existing research and theory. The limitations of these studies will be considered followed by a discussion of what the findings imply for treatment of AVH and future research.

9.2 Findings

a) Study 1: Quantitative Analysis

The quantitative study focuses on cognitive and environmental factors that may distinguish the two groups. Current cognitive models suggest that the difference between the two groups would lie in their appraisals of voices and that these appraisals would be influenced by early experiences, the effect mediated by interpersonal schemata. There is also suggestion that metacognitive beliefs may be important in determining distress associated with AVH.

The current study was limited by the availability of questionnaire measures, it was carried out after Brett et al.'s (2007) comprehensive appraisals interview (AANEX) was published. Thus the psychometric assessment of appraisals was limited to using the BAVQ-R to measure beliefs about voices, the RSO's two dimensions coded as IWMs of self and others in place of a measure of interpersonal schemata (testing Chadwick & Birchwood's 1994 model) and the PSYRATS to measure whether voices are appraised as internally or externally caused (testing Garety et al.'s 2001; 2007 model). There are currently no psychometric measures available that could test Morrison's (2001) hypothesis that the psychotic appraisal is culturally unacceptable. It was hoped that the qualitative data would provide richer information on appraisals and might shed light on this prediction. In a similar fashion, there are no questionnaire measures that could test the predictions of Jackson's (2001; 2006) problem solving account of psychosis and so this will also be considered in the qualitative study. The questionnaire measures of early adverse environments were limited to trauma, attachment and perceived parenting. Again, a more comprehensive assessment of each participants' life history was conducted in the qualitative study.

The two groups proved to be well matched; there were no significant differences between them on sex, age, or educational history. This represents an improvement on previous studies of clinical and non-clinical AVH which employed groups with significant differences on demographic variables (Johns *et al.*, 2001; Leudar *et al.*, 1997; Andrew *et al.*, 2008). The current study also improved upon previous research by giving each of the non-clinical participants a psychiatric assessment (PANSS) to ensure that they were, in fact, psychologically healthy. This assessment demonstrated that the non-clinical group were indeed free of psychiatric symptoms other than hallucinations. The clinical group scored significantly higher on each of the subscales measuring positive, negative and general symptoms of psychopathology. Although the two groups scored similarly on hallucinations, the clinical group had significantly higher scores on delusions and suspiciousness, supporting the claim that it is

appraisals and beliefs that are predictive of psychological disorder, rather than the presence of anomalous experiences alone (Garety *et al.*, 2001; 2007; Morrison, 2001; Chadwick and Birchwood, 1994).

Hypotheses 1-3 about group differences on cognitive variables were all supported, providing partial support for cognitive models' predictions that the two groups would have different appraisals of voices and metacognitive beliefs, respectively. The clinical group did appraise voices as more malevolent, less benevolent and more omnipotent than the non-clinical group which supports Chadwick & Birchwood's (1994) model and corresponds with Andrew *et al.*'s study of beliefs about voices in clinical vs. non-clinical groups. The clinical group also scored higher on the MCQ-30, specifically on the scales measuring negative beliefs about worry and about the need to control thoughts. However, the data did not support Garety *et al.*'s (2001; 2007) assertion that externalising appraisals are key to developing a need for care. The two groups were equally likely to appraise their voices as externally or internally caused, thus supporting findings by Brett *et al.* (2007) and Andrew *et al.* (personal communication).

Hypotheses 4-6 regarding group differences on environmental variables were also supported. The clinical group had more attachment difficulties than the non-clinical group; they were most likely to be rated as 'dismissing', whereas the non-clinical group were mostly 'secure'. This does not support Berry *et al.*'s (2007) suggestion that the 'fearful' attachment category would be most prevalent amongst psychotic samples. The clinical group scored significantly higher on 'attachment avoidance', which indicates that they had more negative IWMs of others but there were no significant differences between the two groups on 'attachment anxiety' which taps IWMs of self. However, there was a trend towards the clinical group having more negative self views. The only significant difference on perceived parenting was for paternal care; the clinical group rated their fathers as significantly less caring than the non-clinical group. This supports Read and Gumley's (2008) finding that the paternal and care subscales of the PBI are more important in determining psychopathology than the maternal and overprotection subscales.

Finally, hypothesis 6 was partially supported. Although the clinical group did not experience more trauma in general, they did have significantly more experience of interpersonal trauma (physical or sexual abuse) during their lifetime. There was also a trend towards them having experienced more childhood sexual and physical abuse, but this was statistically non-significant. Supporting previous findings by Andrew *et al.*, (2008), there were clear differences between the groups in terms of post-traumatic symptomatology, the clinical group were far more likely to report still feeling traumatised by an event in the past. They had significantly more symptoms (and more severe symptoms) of PTSD than the non-clinical group and consequently were significantly more likely to meet the criteria for PTSD (45% vs 15%) according to the PDS measure.

After demonstrating clear differences between the two groups on cognitive and environmental factors, the main aim of Study 1 was to test the predictions of cognitive models in relation to how these factors interact. Hypotheses 7-11 concerned predictions based on cognitive models that suggest how cognitive and environmental factors impact upon voice-related distress. Hypotheses 7 and 8 were supported, indicating that voice-related distress is predicted by beliefs about voices and beliefs about thinking (particularly beliefs about the need to control thoughts). Thus, those participants who believed that their voices were malicious and powerful were more likely to be distressed. Similarly, those who believe that they should always control their thoughts were more distressed by their voices. These findings support the predictions of cognitive models (Chadwick & Birchwood, 1994; Morrison, 2001; Garety *et al.*, 2001; 2007) and other studies that have demonstrated that beliefs about voices and thoughts, respectively, predict distress associated with psychotic experiences (Andrew *et al.*, 2008; Brett *et al.*, 2009).

Hypotheses 9 and 10 stated that early adversity (insecure attachment and trauma, respectively) would be associated with voice-related distress and this relationship would be mediated by beliefs about voices. These two hypotheses were supported by the current analysis; those who were insecurely attached (higher levels of attachment avoidance) or who had more severe post-traumatic symptoms were more distressed about their voices, and this effect was mediated through their more negative beliefs about voices. This supports Chadwick and Birchwood's model (1994; Birchwood *et*

al., 2004) and Andrew *et al.*, who also found post-traumatic symptomatology, rather than the experience of trauma per se, was important in determining beliefs about voices. Interestingly, voice-related distress was related to negative beliefs about other people, rather than negative beliefs about self, which contradicts the findings of Smith *et al.*, 2006 and Close and Garety (1998). However, it is difficult to directly compare the three studies as each used different measures of beliefs about self and others.

Hypothesis 11 proposed that the association between trauma and beliefs about voices would be mediated by negative IWMs of self and others and this was partially supported. Those who had more severe post-traumatic symptoms were more likely to have more malevolent beliefs about voices and this effect was mediated through their more negative beliefs about other people in general. Again, these findings support cognitive models that suggest negative beliefs about AVH are influenced by negative beliefs about others which are formulated by early adverse experiences (Garety *et al.*, 2001; 2007; Morrison, 2001; Birchwood *et al.*, 2004). However, negative IWMs of self did not mediate the relationship between trauma and beliefs about voices.

The current study tested mediational models using Preacher and Hayes (2004) macro which tests indirect effects using the method used by the vast majority of psychological studies, Baron and Kenny's (1986) model, plus Sobel's (1982) test and a new nonparametric method using bootstrapping. The results indicated that the Baron and Kenny method is too liberal and may be liable to producing Type 1 errors. Chapter 6 showed that of the thirteen mediational models tested, Baron and Kenny's test verified that twelve were significant whereas only five were deemed significant according to the more conservative bootstrapping test. Future research should employ the more conservative test to guard against false positives.

b) Study 2: Qualitative Analysis

The qualitative analysis was conducted to learn more about the phenomenology of AVH in the participants' own words to and discover factors that influenced clinical and non-clinical outcomes. Chapter 7 described in detail each of the five main themes that arose from the data, namely 1) The individual, 2) The voice, 3) Beliefs about voices, 4) Sequelae of voices and 5) Voices and mental health.

Apart from the work of Romme and his colleagues, there are no qualitative studies of the subjective experience of voices. This study provided a clearer picture of nonclinical voices and the people that hear them. The non-clinical voice-hearers were happy, busy people who reported very little trauma or upset in their life histories and tended to have good relationships with others. Their voices had generally started in childhood and felt natural. Voices were an accepted part of everyday life and most felt no need to discuss them with other people. Those with spiritual explanations belonged to subcultures where spiritual voices were the norm and their experiences were validated. Those with more psychological explanations tended to keep their experiences to themselves for fear of being misunderstood and stigmatised. Nonclinical voices were as likely to be appraised in spiritual or in psychological terms; as real entities or real-feeling figments of the imagination. No voice-hearer believed that their voices were a sign of mental illness, which was thought to be associated with being under the control of voices that sanction violence or bizarre behaviour. Regardless of whether the voices were assumed to be real entities or not, the power balance remained in favour of the voice-hearer and they rarely felt that the voices were disruptive or had any ill effect. In contrast to the traditional view of voices, and the experiences of the clinical group, the non-clinical voice-hearers felt that their voices were useful and meaningful and had enriched their lives. They felt voices provided company, useful advice and guidance and two had even embarked upon new careers using their voices to give readings to people, either from spirits or animals.

The findings of the qualitative study are now discussed in terms of psychological models of psychosis (Garety *et al.*, 2001; 2007; Morrison 2001; Chadwick & Birchwood, 1994; Jackson 2001; 2006).

Garety *et al.*. (2001; 2007) describe a model whereby positive psychotic symptoms develop through, and are maintained by, cognitive, emotional and social factors. They suggest a stressful triggering event produces anomalous experiences (e.g. voices) in those with a biopsychosocial predisposition. Voices do not become a clinical problem unless they are appraised in certain ways, specifically as external and personally relevant. Distressing voices are more likely to provoke externalising appraisals, and distress influences their content. Appraisals are influenced by existing cognitive biases such as a 'jumping to conclusions' reasoning style, poor theory of mind and

low self-esteem. Social factors are also important; early adversity facilitates low self esteem and externalising appraisals and those who are socially isolated have less access to more normalising appraisals. These cognitive, emotional and social factors, together with safety behaviours, help to maintain the psychotic appraisal and the secondary appraisal of the experience of psychosis itself is also important.

The qualitative analysis partially supports this model, there were definite cognitive, emotional and social differences between the two groups. The clinical participants had more negative beliefs about themselves, other people and their voices. There was also evidence of differences in reasoning styles, the clinical group demonstrated a 'jumping to conclusions' thinking style when they were asked to explain what had caused their voices. Garety *et al.*'s suggestion that emotion would feedback into the content of voices was also supported, for example, NC7 had no problems with his voices until he developed depression and they then became more critical and commanding. In addition to cognitive and emotional differences, there were distinct contrasts between the two groups' past and current social situations. The clinical group had less contact with other people and significantly more relationship difficulties.

However, the essence of this model states that voices develop in response to a stressful triggering event and become problematic when they are appraised as external. Neither of these conditions was supported by the current study. The majority of the non-clinical group could not remember their voices starting as they had been there since early childhood and they denied experiencing trauma. Both groups were equally as likely to report that their voices were external entities. Half of the non-clinical participants believed that their voices were spirits and reported that they were not at all distressing and even improved their lives. In direct opposition to the theory that external appraisals lead to clinical outcomes, NC6 had a much more benign outcome after developing an externalising appraisal of her voices as spirits. Until that point she had believed them to be the result of a developing mental illness and was distressed to the point of planning suicide.

Morrison (2001) argued that AVH could be viewed as intrusions and that the interpretation of such intrusions determines cognitive, behavioural and affective

reactions. He suggested that interpretations can be deemed psychotic if they are culturally unacceptable and that interpretations are influenced by experience. A number of factors can encourage culturally unacceptable interpretations including mood (e.g. anxiety) and physiology (e.g drug use, sleep deprivation). There is some evidence from the qualitative study that the non-clinical participants were less likely to make culturally unacceptable interpretations of their voices as half of them interpreted their voices as products of their own brains and the other half had spiritual explanations that were accepted by their subcultures. The clinical participants did not have their experiences validated by other people and made interpretations that would be less likely to be shared by other people e.g. that they had magical powers or that strangers were talking about them so loudly that they could hear them, even if they were alone in their house. The clinical group were also more likely to report affective disturbances and substance abuse which is suggested by Morrison to increase the frequency of intrusions and the likelihood of making culturally unacceptable interpretations. Morrison also suggests that beliefs that influence interpretations are themselves influenced by experience. It was not possible in this study to examine whether life experiences determined beliefs about voices but there was evidence that those with more negative beliefs about voices (i.e. the clinical group) had more negative life experiences involving trauma and difficulties with interpersonal relationships.

Chadwick and Birchwood (1994) proposed that distress associated with voices is best predicted by beliefs about voices' intentions and power rather than topography or content. They also posited that beliefs about voices are influenced by interpersonal schemata formed in response to experiences with other people, especially primary care givers (Birchwood and Chadwick, 1997). Thus, the relationships people have with their voices will reflect the relationships that they have with others in their social world. The qualitative analysis supported this theory. The clinical group did believe that their voices had more negative intentions and that they were more powerful. Just as Chadwick & Birchwood (1994) reported, in the current study, beliefs about voices did not always follow neatly on from content, e.g. two participants (NC9 and C8) described hearing voices that spoke negatively but that they believed these voices had benevolent intentions. Qualitative analysis does not allow investigation of causal links between beliefs about voices, interpersonal schemata and early experiences.

However, there was evidence that the clinical participants had more negative beliefs about their voices and they also had more negative beliefs about themselves and other people, and more difficulties in close relationships historically and currently.

Jackson (2001; 2006) offered a different perspective, arguing that psychosis could be viewed as an adaptive response to life stress. According to this theory, psychotic experiences can arise as an adaptive result of unconscious problem-solving during conditions of extreme stress. The individual's life experiences will influence the content of the resulting psychotic experiences. The experiences represent a solution to the problematic situation and are not associated with the experience of effort. If the existential crisis is not solved, the experiences will continue to be produced and those that are not validated by others cause more distress and separation from other people, eventually leading to clinical disorder. The qualitative study provides some support for this theory as there were examples of people who started hearing voices during stressful periods of their life (NC6, P1, P2, P8, P10, P17) and one could interpret these voices as having a problem solving function e.g. NPC's voices began at a time when her Mother was critically ill but she said she didn't believe this stress had provoked her voices' onset as she had been more upset years before when her Father and her newborn baby had both died unexpectedly and this trauma had not triggered voices. However, it could be interpreted that her voices had arisen as a solution to a problem she could not control because she believed her Mother was going to die at the time (and this may have brought back memories of her Father and baby's death) and began hearing voices of dead spirits. Perhaps this served to allow her to believe that life goes on after death and allay her fears that she was going to lose her Mother and she had lost her Father and baby for good. It may be that it is not the experience of trauma per se that is important in producing AVH but the implications that trauma has for the person. This may explain why AVH are associated with severe interpersonal trauma such as childhood sexual abuse, which can shatter the individual's view of themselves and the world.

All the clinical participants described voices starting during problematic or traumatic times and one could interpret the resulting voices as a solution to those problems e.g. C1 was a lonely child who spent a lot of time alone and his voices started off as playful company; C2 was a lonely child whose grandfather was abusive and his voice
was a wiser mentor who sought to protect him; C10 felt shy and inadequate around other people, especially girls, and he began hearing a voice telling him he had magical powers. Also supporting this model, the clinical participants had more problematic backgrounds and the content of their voices was more often negative whereas the nonclinical participants had benign voices and happier upbringings. However, five of the six non-clinical participants said that their voices started in childhood and denied experiencing trauma at that age. Indeed, many of them said that they could not remember a time where they had not heard voices and that there was not a clear onset or triggering event. It is not possible to verify their accounts and so perhaps there were triggering events for their voices but they could not remember them or did not want to report them. Alternatively, perhaps voices arise as a result of unconscious problem solving in the context of extreme stress for some people but not for others.

c) fMRI Analysis

There have not been any published studies comparing clinical and non-clinical voice hearers using biological methodology. Advances in neuroimaging have made it possible to study AVH *in vivo* but until recently this had only been achieved in clinical volunteers. One study attempted to examine the cerebral activation during non-clinical AVH by scanning false alarms made by healthy volunteers (with a predisposition to hallucinations) on a signal detection task (Barkus *et al.*, 2007). The current study is the first fMRI study of non-clinical AVH in healthy participants who regularly hear voices. It was also the first to use Belin *et al.*'s (2000) voice area localiser program in voice-hearers, clinical or non-clinical.

Disappointingly, there was not enough viable scanning data from clinical participants to permit direct statistical comparisons with non-clinical participants' data and so the two groups' data were presented separately. The non-clinical participants were presented as part of a group analysis and the clinical participants were presented as a series of cases. The current findings supported those of previous research that demonstrate AVH are associated with increases in activation in speech production and comprehension areas (Broca's and Wernicke's areas, respectively) and auditory areas (STG) (Dierks *et al.*, 1999; Shergill *et al.*, 2000) including the voice-selective area in the STS identified by Belin *et al.*, (2000).

Cerebral activation during AVH was bilateral and so the current findings do not support theory or research that suggests voices originate in the right hemisphere (Jaynes, 1976; Sommer *et al.*, 2008). Also, contrary to three previous studies (Dierks et. al., 1999; Ait-Bentaleb *et al.*, 2000; van de Ven *et al.*, 2005) the current study failed to find significant primary auditory cortex (PAC) activity during AVH, corroborating three studies that also failed to find PAC activity (Lennox *et al.*, 1999; Lennox *et al.*, 2000; Shergill *et al.*, 2000). It may be that the PAC is involved only in clinical AVH, but the data here is not sufficient to test this possibility. It is also possible that the PAC is only involved in some AVH, perhaps ones that are longer in duration, or more vivid (van de Ven *et al.*, 2005). Again, the data here is not sufficient to test this hypothesis and is a possible subject for future research.

Although this was an exploratory study and hence there were no hypotheses, it was suggested that emotional areas might be more active in clinical AVH. The data here were not sufficient to test this suggestion but there were no indications from individual clinical participant scans or the non-clinical whole group analysis that emotional processing areas were significantly activated during AVH. This is in contrast to other studies that have found amygdala activation (Dierks et al., 1999). It may be that the methodology is not able to demonstrate emotional changes with AVH. fMRI analysis relies on clear off and onsets of phenomena like AVH to be able to establish statistical contrasts between cerebral activation in these conditions. It highlights only those cerebral areas that are significantly more active during AVH onsets compared to offsets. As it is unlikely that the participants' emotional reactions would be entirely reactive to AVH presence (i.e. that the participants would be feeling distressed only during the periods of AVH and would be feeling affectively neutral during the rest periods) the uniformity of their affective state would mean cerebral activation of emotional processing areas would not show up as linked to AVH This effect would be compounded by the fact that the majority of periods. participants were anxious throughout the entire duration of the scanning due to unfamiliarity with the procedure and the nature of fMRI scanning, which some find intolerable due to the confined space of the scanner and the scanner noise.

This analysis was extended in a study external to this thesis comparing cerebral activation during non-clinical AVH and auditory imagery, see Appendix 8 for the

draft paper that will be submitted for publication. The seven non-clinical voicehearers' data was compared with scan data from seven healthy volunteers who were instructed to imagine hearing voices whilst being scanned. The findings suggest that both non-clinical AVH and auditory imagery activate the same language and auditory areas (Broca's area and voice-specific STS area, respectively). An interesting difference between these two phenomena was elucidated when the data was analysed temporally. During auditory imagery, the supplementary motor area (SMA) was activated before the auditory and language area but in the AVH condition these three areas were activated simultaneously. The SMA is involved in the ideation of speech as so these findings may explain why AVH are experienced as alien and unintended.

d) Findings Overall

Overall, the findings of the three studies support current psychological models of AVH. The existence of psychologically healthy voice-hearers supports the continuum model of psychosis, particularly the fully dimensional conception of it. The participants were similar in terms of demographic variables, the topography of their voices and cerebral activation during voices. The main differences between the two groups existed in the content of their voices and the distress associated with them and their beliefs about voices. As cognitive models suggest, the current study demonstrates that merely experiencing voices is not sufficient to evoke distress, this was best predicted by cognitive factors such as beliefs about voices and beliefs about thoughts. Study 1's findings suggest that beliefs about voices have more negative experience of voices.

The thesis was designed to test psychological models' predictions about the causal influences on distress associated with AVH. It was not designed to examine the aetiology of AVH. However, the findings do have some relevance to aetiological models of AVH, especially ones that posit that trauma is a key factor (e.g. Garety *et al.*, 2001; 2007; Bentall & Fernyhough, 2008; Jackson *et al.*, 2001; 2006); Although the majority of participants had some trauma history, around a quarter of each group denied ever experiencing trauma. Some had begun hearing voices as young children, before they had experienced anything traumatic. The current study's findings may be taken to mean that trauma is not a necessary condition for developing AVH which

would support research by Hardy et al. (2005) who found that only 53% of their sample of clinical voice-hearers reported experiencing trauma. Of course, there may be discrepancies between experiencing and reporting trauma but presumably not all 47% of their participants were dishonest about their experience of trauma. It could be hypothesised that the predisposition to AVH already exists and that trauma influences the content of AVH. However, Hardy et al. failed to find any links between trauma and AVH content in 42.5% of their sample. They conclude that trauma must impact upon hallucinations through its influence on emotions and beliefs, thus supporting the propositions of cognitive models of AVH (e.g. Garety et al., 2001; 2007) and findings of the current thesis. Both the quantitative and qualitative studies within the current thesis suggest that is not the experience of trauma per se that is important but the consequences trauma has for the individual. It is suggested that trauma that shatters the individual's beliefs about themselves and the world, such as sexual or physical abuse, would be most damaging and influential in the development of voices and appraisals of them. This might help to explain Romme and Escher's (1989) finding that significant events such as pregnancy and falling in love were cited as triggers for the onset of voices by 36% of their sample. Such interpersonal experiences may not be traumatic in the sense of abuse or bereavement but may involve revisions to the individual's beliefs about themselves and the world.

The findings of this thesis suggest that clinical voice-hearers have poorer relationships with their caregivers as children, and are subject to more abuse and separation from their biological parents. One interesting finding was that clinical participants' rated their fathers as significantly less caring than the non-clinical participants. This supports the findings of Read and Gumley (2008) and contradicts the controversial psychoanalytic view that mothers are the critical influence in the development of schizophrenia (e.g. Fromm-Reichmann, 1948). The current study found that those who rated their fathers as less caring were more likely to be distressed by their voices. The prediction that this effect would be mediated by beliefs about voices was not supported (with the bootstrapping technique, however the traditional Baron & Kenny (1986) method did find a significant mediational effect). Thus the mechanism by which paternal behaviour influences voice-related distress should be examined in future research. It could be interesting to examine whether the influence of fathers is

associated in any way to the finding that 71% of voices are male (Nayani & David, 1996).

One interesting finding of the qualitative study that was not expected was that all but one of the non-clinical voice hearers had begun hearing voices in childhood whereas the clinical groups' voices mainly started in late adolescence. This supports the findings of Honig *et al.* (1989) who also found their non-clinical group were more likely than their clinical group to have started hearing voices in primary school. However, Honig *et al.* offer no interpretation of their finding. This finding offers support to the suggestion above that AVH can develop in the absence of trauma and that life experiences (which can include trauma) influence beliefs about the voices. Perhaps because the non-clinical participants started hearing voices as young children they had less awareness of mental health issues or stigma and so were not afraid of their voices. In line with the theory that AVH are misattributed inner speech or intrusions (e.g. Morrison, 2001; Bentall & Fernyhough, 2008), perhaps the content of young children's inner speech, and thus AVH, is more playful and less malicious.

These are interesting suggestions and the AVH of children deserves more research attention. However, the qualitative study's suggestion that a main difference between the clinical and non-clinical group exists in the age of onset is contradicted by the findings of the quantitative study. The quantitative study (which included the whole sample of forty participants compared to just twelve in the qualitative study) found that there were no significant differences between the clinical and non-clinical groups in terms of age of onset and that both groups began hearing voices around 18-20 years old. This discrepancy represents the only area of disagreement between the individual studies of this thesis.

9.3 Limitations of the present thesis

As with any piece of research this thesis has methodological limitations and areas that could be improved. Limitations pertaining to the overall sample of voice-hearers and to each of the individual studies will be discussed below, leading on to a discussion about ideas for future research.

Sample

The most obvious limitation of the present thesis is its small sample size; only forty voice-hearers were studied overall. This reflects both the recognised difficulty in recruiting psychotic samples for research but also in recruiting a relatively invisible population of non-clinical voice-hearers. The majority of non-clinical voice-hearers do not disclose their AVH freely, even to close associates. Although the sample is small, it is comparable to other quantitative studies of these groups and also comparable to fMRI studies of AVH. Moreover, it was too large for the average IPA study and had to be reduced to a more manageable sample of 12 participants. This was unfortunate as it meant many participants with interesting stories about their AVH had to be excluded in order to keep the sample to a size that could be analysed using qualitative methodology.

There are questions about the generalisability of the sample. It could be suggested that the non-clinical volunteers in this self-selected sample were unusual in that they were happy to disclose about their voices to a psychology researcher. It could be that voice-hearers with benign experiences or those with culturally acceptable explanations were over-represented in this sample. It is possible that there are people in the community who hear distressing voices like the clinical group but are able to function without recourse to treatment and have not deteriorated so much that they have been picked up involuntarily by services. Another threat to the generalisability of the findings was the cultural homogeneity of the sample. The vast majority of participants were White British (with only one exception, a participant from Southeast Asia) which represents the ethnic homogeneity of the area where the research was carried out. Most participants reported their religious beliefs as being Atheist, Christian or Christian-Spiritualist, only one participant was Muslim. It would have been interesting to have had a more diverse sample in order to examine the role of culture on beliefs about AVH.

Before attributing differences between the two groups to the variables of interest (i.e. beliefs and life history), it is important that any confounding influences are ruled out and thus groups must be matched as closely as possible. Lack of matching groups is a problem for many studies of clinical and non-clinical AVH (e.g. Johns *et al.*, 01; Leudar *et al.*, 1997; Andrew *et al.*, 2008). The current thesis improved upon these

previous studies by comparing groups that were adequately matched on a number of demographic variables including age, sex and educational attainment. However, IQ was not measured and this was found to be a significant difference in Brett *et al.'s* (2007) study of clinical and non-clinical anomalous experiences. Without measuring IQ it cannot be ruled out that the non-clinical group were just more intelligent and this may, somehow, have permitted them to function better with AVH. However, educational attainment was used here as a proxy measure of IQ to keep the battery of questionnaire measures to a minimum (the study as a whole required 2-3 hours of each participants' time which was already quite a commitment). It may be that educational attainment is a better measure of premorbid intelligence and circumvents the difficulties in psychometric measurement of IQ in those with serious mental illness.

Another significant difference that existed between the groups was in their use of drugs. The qualitative study noted that all the clinical participants had used alcohol or street drugs (some quite extensively) in the past. It is not clear whether there would be significant differences between the two groups as a whole on substance misuse. If the clinical group did have more extensive substance misuse histories, it could be examined whether this has an effect on the dimensions of AVH or the distress associated with AVH. It is possible that extensive drug use facilitates increased frequency of AVH or more culturally unacceptable appraisals of AVH as suggested by Morrison (2001). Alternatively, drug use may be a coping mechanism in response to more distressing AVH. A third possibility is that both drug use and distressing AVH are separate products of trauma history. In the qualitative study, of the participants who were heavy drug users, half had started using them before hearing voices and half had started using them in response to voices. The qualitative data here is not sufficient to distinguish the direction of causality.

Limitations of Study 1

The quantitative methodology suffered from the same problems of many research studies – that of using self-report measures to tap personal and historical experiences. Such measures are subject to memory and social desirability biases. That self-report measures may not provide accurate assessment of phenomena is highlighted by the fact that the qualitative and quantitative measures of trauma did not always match up

perfectly. There were instances where participants talked about difficult experiences in their interviews but did not include this on the self-report measure of trauma. There were also participants who denied that they had experienced any trauma during the interview and then ticked boxes for traumatic events on the Posttraumatic Diagnostic Scale (PDS). This may reflect how it is easier to tick a box to indicate you have experienced sexual abuse than to divulge the abuse and talk about it in full during an interview. This was one of the reasons Andrew *et al.* (2008) used the PDS in their study and why it was employed here.

The PDS is designed to yield PTSD symptom scores with regard to a trauma which the participant has rated as the most subjectively distressing trauma. The PDS does not provide qualitative data about trauma. Trauma in this questionnaire is merely rated as being in one of twelve general categories (e.g. a serious accident, physical assault, sexual assault etc) and as occurring in childhood or adulthood. Thus it is not clear whether the trauma data in this study predates the experience of voices, it is likely that some participants were rating trauma that had occurred after they were already hearing voices. A more detailed measure of trauma such as the Childhood Trauma Questionnaire (CTQ: Bernstein & Fink, 1998) may have been more informative. However, Andrew *et al.* also chose the PDS because they believed that it was unethical to ask detailed questions about trauma outside of a therapeutic relationship and this was also a concern for the current researcher who had no clinical training in obtaining trauma histories.

The hypothesis that the association between trauma and beliefs about voices would be mediated by negative interpersonal schemata was supported. The author was not aware of any available measures of interpersonal schemata so the attachment subscales were used as proxy measures as they can be coded in cognitive terms as Bowlby's internal working models (IWMs) of self and others. IWMs are slightly different from interpersonal schemata in that they incorporate affect associated with relationships as well as beliefs. The questions on the RSQ measure of attachment revolve around issues of trust, intimacy and dependency in relationships rather than declarative beliefs about the self as, e.g., useless or unworthy, and others as, e.g. untrustworthy and dangerous, which may be important in developing psychosis. After data collection commenced on this project, Fowler, Freeman, Smith and Kuipers *et al.* (2006) published the Brief Core Schema Scales (BCSS) which does measure these type of schematic evaluations. This measure would have been preferable to the one used in this study and should be utilised in future studies of interpersonal schemata in psychosis.

With regard to the design of the study, a prospective design would have been better placed to explore causal relationships than the cross-sectional methodology employed. However, a longitudinal study was beyond the scope of this PhD thesis and causal inferences were made more plausible by utilising mediational analyses. In addition, the current study employs a more stringent test of mediation (bootstrapping) than the vast majority of psychological studies which still rely on Baron and Kenny's (1986) method.

Limitations of Study 2

IPA is ordinarily used to explore the phenomenology of an experience that is common to all participants within a group e.g. the experiences of a group of women who all care for their husbands with Parkinson's disease (Williamson, Simpson & Murray, 2008). The current study focused on a subjective and heterogeneous experience that could broadly be distinguished as clinical and non-clinical. In addition to investigating the phenomenology of clinical and non-clinical voices, a second aim was to compare and contrast these distinct experiences, in the context of the respondents' individual life histories. Thus, there was a move away from the usual IPA write up and each group was compared and contrasted on each of the themes. This was influenced by the work of Campbell and Morrison (2007) who used this technique to compare and contrast experiences of paranoia in a clinical and nonclinical group. In this new aim of examining group differences, there is some blurring with the objectives of quantitative research but it should be remembered that conclusions cannot be drawn from this analysis as they can be in quantitative research. The current conclusions are the product of the individual researcher's interpretation of what twelve selected interviewees chose to tell her about their unique experiences and thus are subject to numerous sources of bias and are not generalisable to the overall population of voice-hearers. However, IPA does not aspire to objectivity and generalisability, the purpose of this study was to examine the experiences of the current participants in more detail. The validity of the themes and the conclusions about group differences were checked through discussion with a psychologist with significant expertise in psychosis and qualitative research. It may also have been of benefit to verify the analysis with the participants.

Limitations of Study 3

The main aim of the fMRI study (to compare the two groups' cerebral activation during AVH) could not be examined because of the low number of clinical volunteers who provided viable data. However, the sample size is comparable to other fMRI studies of voice-hearers and reflects the difficulty in recruiting for this type of study. Firstly, only participants who have clear off and onsets of voices can be studied and those who are likely to hallucinate within the half an hour scanning period. Next, these participants must be willing to participate (e.g. to not be anxious or claustrophobic, to turn up to scanning appointments) and to be able to participate (e.g. not to have metal in the body, to follow the button pressing protocol, to keep motionless in the scanner). Once all these criteria are satisfied, one has to hope that the volunteer actually hears voices within the scanner. These obstacles help to explain why only 19 out of 40 participants initially volunteered for a scan and from these, only 10 viable data sets were obtained. It may be suggested that the main obstacle to recruiting for this type of study is anxiety on the part of volunteers. Perhaps prior exposure to a MRI system simulator (Rosenberg, Sweeney, Gillen, Chang et al., 1997) may have reduced anxiety by allowing volunteers to get used to the scanning environment before their fMRI testing session. Unfortunately this facility was not available and only a pre-participation tour of the scanning suite was possible.

9.4 Future directions

Future research should aim to improve upon the methodology of the current thesis by recruiting a larger and more generalisable sample of voice-hearers. A larger sample would increase the study's power to find effects, e.g. the trends shown in the current study (e.g. for clinical participants to have more negative views of themselves and to have experienced more abuse in childhood) may prove to be significant findings in a larger sample. A larger sample would also permit improved statistical analysis, most notably in allowing the comparison of non-clinical and clinical AVH using fMRI. It would also allow the examination of gender differences as a recent study has

suggested that severe childhood abuse is associated with psychosis in women but not men (Fisher, Morgan, Dazzan, Craig *et al.*, 2009).

The current thesis largely supported psychological models' suggestions that cognitive and environmental factors are important in determining the clinical or non-clinical outcome of AVH. The current study investigated beliefs about thoughts and voices, respectively, and whether these cognitive factors were influenced by environmental factors such as attachment and trauma. The thesis does not claim to have exhausted investigation of influential factors. Future research should build upon this study by investigating factors that were examined here in a more thorough fashion, e.g. using the AANEX interview to examine a wider range of appraisals, and examine cognitive and environmental factors that were not investigated in this thesis.

This thesis supported Birchwood *et al.*'s (2004) assertion that voice-related distress would be predicted by beliefs about voices which are rooted in interpersonal schemata. The quantitative study reported that voice-related distress was predicted by insecure attachment (specifically attachment avoidance) and that the relationship was mediated by beliefs about voices. Recent research has shown that voice-related distress is associated with relating styles, more so than with beliefs about voices' power and intent. Vaughan and Fowler (2004) found that distress was associated with the voice relating in dominating and insulting manner and the voice-hearer reacting with suspicion and lack of communication. Distress was more strongly associated to these relating styles than to beliefs about voices' malevolence or omnipotence. Future research should extend this research by examining relating styles in non-clinical voice-hearers and establish whether such styles are grounded in interpersonal schemata.

The context in which appraisals are made is important, and would be further elucidated by employing the AANEX interview. There were some differences in environmental factors that were not anticipated and deserve further attention; the clinical group rated their fathers as less caring and they were more likely to have extensive drug histories. The data are not sufficient to conclude whether these factors influence the development of clinical AVH or whether they are themselves the result of more distressing AVH.

This section has concentrated on suggestions for future research based on cognitive and environmental influences but there is a dearth of studies concerning biological factors. The current study is the first to compare the neurobiology of clinical and nonclinical voices. Future research should build upon the current thesis by employing larger samples to compare activation during AVH in clinical and non-clinical groups. The finding in study 2 that voice-hearers also have relatives who hear voices may also suggest that genetic studies of AVH compare clinical and non-clinical groups.

Finally, this thesis has concentrated on elucidating the factors that influence distress and need for care but it has overlooked aetiological factors in AVH. It would be interesting to study the causes of voices in these two groups, to discover whether they have the same aetiological path that bifurcates or are the product of distinct origins. Trauma is a necessary factor in many aetiological models of AVH (e.g. Garety *et al.*, 2001; 2007; Bentall & Fernyhough, 2008) but around a quarter of the current study's sample denied ever experiencing trauma. Many of them said that could not remember a time where they did not hear voices, that they'd always felt natural and that there did not appear to be a memorable trigger. These findings suggest the possibility that trauma is only one of many factors that can cause AVH or that it is does not actually cause AVH but influences the content or the distress associated with them. In addition, the literature has concentrated on sampling psychiatric samples and has paid little attention to the role of trauma in non-clinical AVH.

9.5 Implications for treatment

The clinical volunteers spoke about their experiences of treatment in Study 2. This indicated that for the majority, medication was the only treatment option utilised. They had mixed opinions about medication, some finding it very effective, others not so and all reported some dissatisfaction with side effects. This reflects the wider research literature that suggests hallucinations persist in 25-50% of patients despite using medication (Pantelis & Barnes, 1996) and that, on average, 50% of patients do not adhere to their medication properly (Lacro, Dunn, Dolder, Leckband *et al.*, 2002). The findings of this thesis propose that therapeutic interventions, both psychological and biological, that may be useful adjuncts to traditional psychopharmacotherapy.

Psychological Interventions

The current thesis has demonstrated that beliefs are important in determining distress associated with AVH and thus interventions that target beliefs, such as Cognitive Behavioural Therapy (CBT), may be useful. There is evidence that group CBT can reduce ratings of voices' omnipotence and increase participants' perceived level of control (Chadwick, Sambroke, Rasch & Davies, 2000). Tai and Turkington (2009) have recently reviewed the evolution of CBT for schizophrenia and note that there has been a shift away from a central goal of changing thoughts towards aiming to change participants' relationships with their thoughts. This notion is consistent with the findings of this thesis, which showed that the clinical group were more likely to believe that their worries were uncontrollable and dangerous and that they should be able to control their thoughts. The best predictor of distress associated with voices was the belief that thoughts should be controlled. There are a number of therapeutic developments to CBT that promote acceptance of thoughts and voices and abandoning counterproductive attempts to control them such as mindfulness training and Acceptance and Commitment Therapy (ACT) which have been shown to reduce the distress associated with voices (e.g. Veiga-Martinez et al., 2008; Newman Taylor et al., 2009).

Many participants in the current study commented that it had been the first time that they had discussed their voices in detail with someone else and that this had been an interesting and useful experience for them. Many of the clinical participants were interested in learning about non-clinical experiences and the possibility that voices are not necessarily always distressing. Many of the non-clinical participants had never discussed their voices before for fear of being labelled mentally ill and knew very little about voices. Both groups were intrigued to learn more from the researcher about voices that other people had. This supports the findings of research on group therapy that reported members found it extremely difficult to talk about their voices to either family or friends (for fear of being judged negatively) or professionals (for fear of enforced medication or hospitalisation) and benefited from the catharsis of talking about their voices and learning that others have similar experiences (Chadwick *et al.*, 2000). According to these findings, hearing voices groups should discuss the experiences of voice-hearers who do not suffer from psychosis. There is evidence that such normalisation interventions are successful in alleviating distress associated with voices and delusions (Kingdon & Turkington, 1994; 1996). On a wider level, information about voices outside of mental illness should be disseminated to the relatives of those diagnosed with mental health problems, and the general public as a whole. This may reduce the stigma attached to hearing voices which serves to consolidate the distress associated with voices. These principles are utilised and described in the literature of the International Network for Training, Education and Research into Hearing Voices (Intervoice; www.intervoiceonline.org).

The thesis suggests that not only are beliefs important but that these beliefs originate from early adversity, particularly early trauma and attachment problems. Therapeutic interventions should therefore consider voices in the context of the individual's life history, with questions about trauma and life events being standard during assessment and these factors being addressed in interventions (e.g. Romme & Escher, 2000).

Biological Interventions

Although many were anxious about the fMRI procedure, many participants were intrigued by the prospect of seeing what was happening in their brains while they heard voices. Many were interested to see whether this would show something was 'wrong' with their brains. fMRI could be used in conjunction with psychotherapy as part of psychoeducation about AVH, demonstrating how they originate in the brain. Using comparisons of clinical and non-clinical scans, clinicians could demonstrate to voice hearers that there something unusual in the way that their brain processes speech but not necessarily pathological. This may demonstrate to those individuals who require treatment that beliefs about voices are what is important in determining outcome. However, it should be recognised that merely seeing a brain scan would not be enough to change long held and valued explanations. There were examples in both groups of participants who viewed their scans but this did not change their opinions that voices originate from external sources. One clinical volunteer was honest enough to disclose before he was scanned that he believed that the findings would not change his long-standing (50 years) appraisal of his voice as a benevolent guide from another dimension. He said that even if the scan proved biologically that he was talking to himself that he would probably be able to convince himself of other explanations that affirmed his appraisal, e.g. that the investigators were deceiving him. This participant was one of a number for whom voices were a protective force and evidence of their

specialness, contradicting the veracity of this type of voices would be disastrous for their well being.

fMRI could also prove useful in biological treatment of AVH. Research evidence is accumulating on the effectiveness of transcranial magnetic stimulation (TMS) applied to the temporal lobes as a treatment for AVH (See Aleman, Sommer & Kahn, 2007 for a meta-analysis of studies). Aleman et al. (2007) found that overall there was support for the efficacy of TMS in reducing the severity of AVH specifically, but there was no effect on positive symptoms in general. However, not all the studies they reviewed supported the efficacy of TMS. It could be argued that some of the mixed findings could be due to individual variation in the location of hallucinationrelated activity. All the studies reviewed by Aleman et al. (2007) stimulated the left temporoparietal areas but research evidence, including this study, suggests that hallucination-related activity is not limited to the left hemisphere in all participants, it can be right-sided or bilateral. Thus fMRI could be used to locate hallucinationrelated brain activity in individuals before TMS to maximise its effectiveness. Preliminary studies of fMRI-guided TMS have conversely reported that it is more successful than TMS only (Hoffman, Hampson, Wu, Anderson et al., 2007) and that is not associated with an improvement in efficacy (Sommer, Slotema, de Weijer, Blom et al., 2007). Further research is necessary to establish whether fMRI localisation of AVHs could aid TMS therapy.

fMRI could also be used to guide another type of potential treatment: neurofeedback. Neurofeedback is a technique whereby participants can learn to regulate their own cerebral activity using real-time feedback. Traditionally neurofeedback has utilised EEG but more recently fMRI has been employed, which has better spatial resolution (see Weiskopf, Scharnowski, Veit, Goebel *et al.*, 2004, for a review). There has been no research into the efficacy of neurofeedback in reducing voice-related distress but recent research has demonstrated that it can be used to train individuals to selfregulate their cerebral emotion networks (Johnston, Boehm, Healy, Goebel *et al.*, in press). This technique is very much in its infancy and needs much more development before it could be considered as a clinical tool.

9.6 Conclusion

The aims of this thesis were to examine the phenomenology of AVH and to investigate the cognitive, environmental and biological factors that may influence a clinical or non-clinical outcome for voice-hearers. Its findings support current psychological theories about the nature and development of psychosis and are consistent with the aims of the International Network for Training, Education and Research into Hearing Voices (Intervoice). The clinical and non-clinical AVH groups were well matched on demographic variables and their AVH appeared to have similar topography and biological basis. However, there were clear differences between the two groups in terms of voice content, distress, beliefs about voices, relationships with voices and life history. Distress associated with voices was predicted by beliefs about voices, which were in turn predicted by trauma and attachment variables, thus supporting current psychological theories on distress in AVH. The current thesis improves upon previous research by employing groups that were well matched and utilising a range of methodologies. However, the thesis was not planned as an exhaustive investigation of need for care associated with AVH and ideas for future research are suggested. It is hoped that research of this kind will contribute to a better understanding of voices and a reduction of the widespread ignorance and stigma that engenders so much distress.

Appendix 1: Ethical Approval.

Pwyllgor Moeseg Ymchwil Canolog Gogledd Cymru

North Wales Central Research Ethics Committee

Mrs. Julie Whitmore,	
Gweinyddwraig Etheg /	Č.
Ethics Administrator,	
Ystafell 1038 / Room 1	038,
Ysbyty Glan Clwyd,	
Rhyl, Denbighshire	
LL18 5UJ	

Dear Dr Linden

Study title:	Functional magnetic resonance imaging of hallucinations in patients with
REC reference:	05/WNo02/22
Amendment number:	2
Amendment date:	02 February 2007

Thank you for submitting the above amendment, which was received on 02 February 2007. It is noted that this is a modification of an amendment previously rejected by the Committee (our email of 02 February 2007 refers).

The modified amendment was considered at the meeting of the Sub-Committee of the REC held on 02 February 2007. A list of the members who were present at the meeting is attached.

Ethical opinion

I am pleased to confirm that the Committee has given a favourable ethical opinion of the modified amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

Document	Version	Date
Participant Information Sheet: Non	2	02 February 2007
Patient		
Participant Information Sheet	2	02 February 2007
Participant Consent Form: Non Patient	2	02 February 2007
Participant Consent Form: Patient	2	02 February 2007
On line Application Form	3	08 December 2005
Modified Amendment	2	02 February 2007

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Research governance approval

All investigators and research collaborators in the NHS should notify the R&D Department for the relevant NHS care organisation of this amendment and check whether it affects research governance approval of the research.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

REC ref: 05/WNo02/22 Please quote this number on all correspondence

Yours sincerely

Mrs Julie Whitmore Ethics Coordinator

E-mail: julie.whitmore@cd-tr.wales.nhs.uk

Copy to: Professor Richard Hastings, School of Psychology, University of Wales, Bangor, Brigantia Building, Penrallt Road, Bangor. Gwynedd. LL57 2AS Dr. Rossela Stoicescu Jones, R & D Manager, North West Wales NHS Trust, Ysbyty Gwynedd, Bangor

Attendance at Sub-Committee of the REC meeting on 02 February 2007

Name	Profession	Capacity
Mr Roger Hebden	Lay Member	Vice Chair
Mr Russell Jones	Psychiatric Liaison Nurse Manager	Clinical Expert

Also in attendance:

Name	Position (or reason for attending)
Mrs Julie Whitmore	Ethics Administrator

Appendix 2: Advert for non-clinical participants.



Do you hear voices that other people cannot hear?

I am very keen to talk to possible participants about an innovative research project I am conducting on the phenomena of 'hearing voices' or 'clairaudience'. This is an exploratory, investigative study, and as far as possible I aim to conduct the research without current psychiatric and spiritual assumptions about these phenomena. I will be using both modern brain imaging methods, and interviews which will give participants the opportunity to discuss their experiences and how they understand them. I would be particularly interested to hear from people who take a positive view of these experiences.

If you think you might be interested in participating, please contact me, Katy Thornton, at Department of Psychology, University of Wales, Bangor, Brigantia Building, Penrallt Road, LL57 2AS, psp259@bangor.ac.uk, 07971 986277.

Appendix 3: Information sheet for non-clinical participants.

Ysgol Seicoleg Prifysgol Cymru, Bangor

Adeilad Brigantia, Ffordd Penrallt Bangor, Gwynedd LL57 2AS

Ffon:(01248) 382211 - Ffacs:(01248) 382599 e-bost: psychology@bangor.ac.uk www.psychology.bangor.ac.uk



School of Psychology University of Wales, Bangor

Adeilad Brigantia, Penrallt Road Bangor, Gwynedd LL57 2AS

Tel:(01248) 382211 - Fax:(01248) 382599 e-mail: psychology@bangor.ac.uk

Participant Information Sheet

1. Study Title:

Functional magnetic resonance imaging of hallucinations in patients with schizophrenia, other mental disorders, and healthy participants.

2. What is the purpose of the study?

We would like to find out why some people have positive experiences of hearing voices and why some people have negative experiences that lead them to seek treatment. We are especially interested in learning from voice-hearers' own thoughts and opinions about hearing voices rather than relying on traditional psychiatric and spiritual perspectives on voicehearing. We are especially interested in finding out more about voice-hearers as people and learning about their life histories, to see if their life histories are different from people who don't hear voices. The information collected will be written up for one of the researcher's (Katy Thornton) PhD thesis and may be published in scientific journals.

3. Why have I been chosen?

We have chosen you because you reported hearing voices recently.

4. Do I have to take part?

No. It is up to you to decide whether or not to take part. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You are still free to withdraw at any time and without giving a reason.

5. What will happen to me if I take part?

We would like to interview you and give you some questionnaires. We will do these in two separate sessions, which could take up to 3 hours in total. You will be paid £10 an hour for your participation and we will reimburse any travel expenses.

The interview will involve the researcher asking you questions about your life history, your experiences of hearing voices and your own thoughts and opinions about the voices your hear. This interview is expected to last around one hour but could be shorter or longer, depending on how much you want to talk. We would like to tape-record this interview to allow the researcher to listen to it again and type it out. This transcript of the interview will be anonymised i.e. any details that could be used to identify you (such as names, places etc) will

be changed. Doing an interview like this will allow us to collect very detailed information on your own personal experience of hearing voices.

The questionnaires will ask about your thoughts and feelings about hearing voices. There are also questionnaires about your life history, for example, your relationship with your parents and any past traumas you may have suffered. We expect that these questionnaires could take up to 2 hours to complete. You can take a break anytime you like and we can do them in two separate sessions if you prefer. Getting information from standard questionnaires like this will allow us to compare your responses to those of other people.

Following completion of the interview and questionnaires, we would like to offer you a brain scan to explore the workings of your brain while you are hearing voices. We use a brain scanning technique called functional magnetic resonance imaging (fMRI), which is a type of the standard clinical MRI scan. The brain scan would take place at the School of Psychology in Bangor. You will be paid £10 per hour for your participation and your travel expenses, if you have any, will be reimbursed.

The brain scan involves lying still in the scanner while images are obtained for about 30 minutes, your task will be to press a button whenever you hear a voice. The scanner uses a magnetic field – no radiation is involved and no dye needs to be injected. The scanner is not painful in any way but it does make a loud noise.

You will be able to see outside the scanner – through mirrors—during the scan and will be able to communicate with the radiographer. If you find the scan to be uncomfortable in any way, the radiographer will immediately stop the scan.

Because a magnetic field is involved, you cannot be scanned if you have a pacemaker, or metal in your body. We will go through a list of relevant items with you before scanning. Because the scanner is configured as a narrow tube, some individuals with claustrophobia (fear of confined spaces) may find the procedure uncomfortable or intolerable. So, you cannot be scanned if you have a history of claustrophobia.

As this is not a diagnostic MRI scan, we will not provide a formal report. However, if we do find something unusual we will inform you.

6. What are the possible disadvantages and risks of taking part?

Every effort will be made to make this interesting and comfortable for you. However, the research involves discussing issues (e.g. family history, past trauma) that could be distressing. You can choose not to answer certain questions or stop the interview/ questionnaires at any point if you feel distressed. If you require support as a result, we undertake to provide that through Dr. Mike Jackson, Clinical Psychologist.

The fMRI procedure is not painful or dangerous in any way. The MRI scanner at the hospital will be operated by a NHS radiographer to ensure the safety of the test.

7. What are the possible benefits of taking part?

There are no direct benefits to you in participating in this study. However, the information gained may prove helpful to those suffering from psychological problems as a result of hearing voices in the future.

8. What if there is a problem?

If you have a concern about any aspect of this study, you should ask to speak with the researchers who will do their best to answer your questions. Please contact Dr David Linden at the School of Psychology, University of Wales, Bangor, Gwynedd, LL57 2AS, phone 01248 382211.

If you remain unhappy and wish to complain formally, please contact either Professor Richard Hastings, Acting Head of School, School of Psychology, University of Wales, Bangor, Gwynedd, LL57 2AS or to the Executive Medical Director of the North West Wales NHS Trust, Ysbyty Gwynedd, Bangor, Gwynedd, LL57 2PW.

9. Will my taking part in the study be kept confidential?

Yes, the information you give us will be kept confidential and will be stored securely in a locked filing cabinet that can only be accessed by the authorised researchers. The research may be published in scientific journals but your name will not appear on any public document, nor will the results of the study be published in a form that would make it possible for you to be identified.

The only exception to this is if you tell us something that suggests that you or someone else is at risk of being harmed, in this case we may not be able to keep the information confidential.

10. Contact Details:

We welcome the opportunity to answer any questions you may have about any aspect of this study or your participation in it. Please contact Dr. David Linden at the School of Psychology, University of Wales, Bangor, Gwynedd, LL57 2AS, phone 01248 382211, email d.linden@bangor.ac.uk.

11. Who is organising and funding the research?

The School of Psychology and the North Wales Clinical Psychology Programme, University of Wales, Bangor.

12. Who has reviewed the study?

This study was given a favourable ethical opinion for conduct in the NHS by the North Wales Central Research Ethics Committee.

If you decide to take part in this study you will be given a copy of this information sheet and a signed consent form to keep.

Thank you for taking the time to read this sheet and for considering taking part in our study.

Appendix 4: Consent sheet for non-clinical participants.

Ysgol Seicoleg Prifysgol Cymru, Bangor

Adeilad Brigantia, Ffordd Penrallt Bangor, Gwynedd LL57 2AS

Ffon:(01248) 382211 - Ffacs:(01248) 382599 e-bost: psychology@bangor.ac.uk www.psychology.bangor.ac.uk



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Tel:(01248) 382211 - Fax:(01248) 382599 e-mail: psychology@bangor.ac.uk www.psychology.bangor.ac.uk

m 1

CONSENT FORM

Title of Project: Functional magnetic resonance imaging of hallucinations in patients with schizophrenia, other mental disorders, and healthy participants.

Name of Researchers: Dr David Linden, Dr Mike Jackson and Katy Thornton (PhD student). Sian Counihan, Jasper Palmier-Claus and Yu Guo (MSc students)

				Please initial box
1.	I confirm that I have read and sheet dated April 2007 (version I have had the opportunity to con- questions and have had these a			
2.	I understand that my participat free to withdraw at any time, v my medical care or legal rights			
3.	I agree to take part in the inter above study.			
4.	I consent to having my intervio			
5.	I consent to having a fMRI bra			
Na	me of Participant	Date	Signat	ure
Re	searcher	Date	Signatu	re

Appendix 5: Information sheet for clinical participants.

Ysgol Seicoleg Prifysgol Cymru, Bangor

Adeilad Brigantia, Ffordd Penrallt Bangor, Gwynedd LL57 2AS

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Tel:(01248) 382211 - Fax:(01248) 382599 e-mail: psychology@bangor.ac.uk www.psychology.bangor.ac.uk

Participant Information Sheet

1. Study Title:

Functional magnetic resonance imaging of hallucinations in patients with schizophrenia, other mental disorders, and healthy participants.

2. What is the purpose of the study?

We would like to find out why some people have positive experiences of hearing voices and why some people have negative experiences that lead them to seek treatment. We are especially interested in learning from voice-hearers' own thoughts and opinions about hearing voices rather than relying on traditional psychiatric and spiritual perspectives on voicehearing. We are especially interested in finding out more about voice-hearers as people and learning about their life histories, to see if their life histories are different from people who don't hear voices. The information collected will be written up for one of the researcher's (Katy Thornton) PhD thesis and may be published in scientific journals.

3. Why have I been chosen?

We have chosen you because you have a psychiatric diagnosis and have or have not reported hearing voices recently.

4. Do I have to take part?

No. It is up to you to decide whether or not to take part. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive.

5. What will happen to me if I take part?

We would like to interview you and give you some questionnaires. We will do these in two separate sessions, which could take up to 3 hours in total. You will be paid £10 an hour for your participation and we will reimburse any travel expenses.

The interview will involve the researcher asking you questions about your life history, your experiences of hearing voices and your own thoughts and opinions about the voices your hear. This interview is expected to last around one hour but could be shorter or longer, depending

on how much you want to talk. We would like to tape-record this interview to allow the researcher to listen to it again and type it out. This transcript of the interview will be anonymised i.e. any details that could be used to identify you (such as names, places etc) will be changed. Doing an interview like this will allow us to collect very detailed information on your own personal experience of hearing voices. If you don't hear voices we will ask questions only about you and your life history.

The questionnaires will ask about your thoughts and feelings about hearing voices. There are also questionnaires about your life history, for example, your relationship with your parents and any past traumas you may have suffered. We expect that these questionnaires could take up to 2 hours to complete. You can take a break anytime you like and we can do them in two separate sessions if you prefer. Getting information from standard questionnaires like this will allow us to compare your responses to those of other people. Again, if you don't hear voices we will give you questionnaires that ask only about your life history, which could take up to 1 hour.

Following completion of the interview and questionnaires, we would like to offer you a brain scan to explore the workings of your brain while you are hearing voices. If you do not hear voices we would still like to give you a brain scan to see if there are any differences in the brain scans of people who hear voices and people who don't hear voices. We use a brain scanning technique called functional magnetic resonance imaging (fMRI), which is a type of the standard clinical MRI scan. Brain scans will take place at Ysbyty Gwynedd in Bangor for inpatients and at the School of Psychology in Bangor for outpatients. You will be paid £10 per hour for your participation and your travel expenses, if you have any, will be reimbursed.

The brain scan involves lying still in the scanner while images are obtained for about 30 minutes, your task will be to press a button whenever you hear a voice. The scanner uses a magnetic field – no radiation is involved and no dye needs to be injected. The scanner is not painful in any way but it does make a loud noise.

You will be able to see outside the scanner – through mirrors—during the scan and will be able to communicate with the radiographer. If you find the scan to be uncomfortable in any way, the radiographer will immediately stop the scan.

Because a magnetic field is involved, you cannot be scanned if you have a pacemaker, or metal in your body. We will go through a list of relevant items with you before scanning. Because the scanner is configured as a narrow tube, some individuals with claustrophobia (fear of confined spaces) may find the procedure uncomfortable or intolerable. So, you cannot be scanned if you have a history of claustrophobia.

As this is not a diagnostic MRI scan, we will not provide a formal report. However, if we do find something unusual we will inform you.

6. What are the possible disadvantages and risks of taking part?

Every effort will be made to make this interesting and comfortable for you. However, the research involves discussing issues (e.g. family history, past trauma) that could be distressing. You can choose not to answer certain questions or stop the interview/ questionnaires at any point if you feel distressed. If you require support as a result, we undertake to provide that through Dr. Mike Jackson, Clinical Psychologist.

The fMRI procedure is not painful or dangerous in any way. The MRI scanner at the hospital will be operated by a NHS radiographer to ensure the safety of the test.

7. What are the possible benefits of taking part?

There are no direct benefits to you in participating in this study. However, the information gained may prove helpful to those suffering from psychological problems as a result of hearing voices in the future.

8. What if there is a problem?

If you have a concern about any aspect of this study, you should ask to speak with the researchers who will do their best to answer your questions. Please contact Dr David Linden at the School of Psychology, University of Wales, Bangor, Gwynedd, LL57 2AS, phone 01248 382211.

If you remain unhappy and wish to complain formally, please contact either Professor Richard Hastings, Acting Head of School, School of Psychology, University of Wales, Bangor, Gwynedd, LL57 2AS or to the Executive Medical Director of the North West Wales NHS Trust, Ysbyty Gwynedd, Bangor, Gwynedd, LL57 2PW.

9. Will my taking part in the study be kept confidential?

Yes, the information you give us will be kept confidential and will be stored securely in a locked filing cabinet that can only be accessed by the authorised researchers. The research may be published in scientific journals but your name will not appear on any public document, nor will the results of the study be published in a form that would make it possible for you to be identified.

The only exception to this is if you tell us something that suggests that you or someone else is at risk of being harmed, in this case we may not be able to keep the information confidential.

10. Contact Details:

We welcome the opportunity to answer any questions you may have about any aspect of this study or your participation in it. Please contact Dr. David Linden at the School of Psychology, University of Wales, Bangor, Gwynedd, LL57 2AS, phone 01248 382211, email d.linden@bangor.ac.uk.

11. Who is organising and funding the research?

The School of Psychology and the North Wales Clinical Psychology Programme, University of Wales, Bangor.

12. Who has reviewed the study?

This study was given a favourable ethical opinion for conduct in the NHS by the North Wales Central Research Ethics Committee.

If you decide to take part in this study you will be given a copy of this information sheet and a signed consent form to keep.

Thank you for taking the time to read this sheet and for considering taking part in our study.

Appendix 6: Consent sheet for clinical participants.

Ysgol Seicoleg Prifysgol Cymru, Bangor

Adeilad Brigantia, Ffordd Penrallt Bangor, Gwynedd LL57 2AS

Ffon:(01248) 382211 - Ffacs:(01248) 382599 e-bost: psychology@bangor.ac.uk www.psychology.bangor.ac.uk



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CONSENT FORM

Title of Project: Functional magnetic resonance imaging of hallucinations in patients with schizophrenia, other mental disorders, and healthy participants.

Name of Researchers: Dr David Linden, Dr Mike Jackson and Katy Thornton (PhD student). Sian Counihan, Jasper Palmier-Claus and Yu Guo (MSc students)

				Please initial box
1.	I confirm that I have read an sheet dated April 2007 (ver I have had the opportunity t questions and have had thes	nd understand the information of the state o	ation Jy. n, ask	
2.	I understand that my particip free to withdraw at any time my medical care or legal rig	pation is voluntary and th , without giving any reas hts being affected.	nat I am son, without	
3.	I understand that relevant see data collected during the stu- where it is relevant to my ta permission for these individ			
4.	. I agree to take part in the interview and questionnaires part of the above study.			
5.	I consent to having my inter	view tape-recorded.		
6.	I consent to having a fMRI	orain scan.		
Na	me of Participant	Date	Signature	2
Re	searcher	Date	Signature	

Appendix 7: Semi-structured interview schedule.

DRAFT THEMES FOR INTERVIEW SCHEDULE

1. GENERAL INFORMATION

- a) Current Situation
- Occupation
- Family
- Social life
- Religion
- General level of satisfaction with life
- Use of drugs

b) Background

- Childhood family
 - What were parents like?
 - Brothers and sisters
- Religion
- Trauma in childhood

2. EXPERIENCE OF HEARING VOICES

- a) First Experience
- What happened?
- When? Where?
- Positive/negative experience?
- What did you think of it?
- What did you think caused it?
- Did you tell anyone else? Who? Why? What was their reaction? Was it helpful?

b) Experiences Since

- What further experiences have you had?
- When? Where?
- Positive/negative experiences?
- Can you influence them?
- Do you tell people? Who? Why? What is their reaction?
- How does it effect your life? Answered a need? Affected your beliefs?

3. BELIEFS ABOUT HEARING VOICES

- Before your first experience what did you think about people who hear voices?
- What do you think about it now?
- How do you think society views people who hear voices?
- How do you think society would view you particularly?
- Do you know anybody else who hears voices?
- Did you ever think you were going mad?
- What made you decide that you were/not?
- Did you have prior knowledge about mental illness?

Appendix 8: fMRI paper on AVH and Imagery.

The brain's voices: Temporal order between motor and voice perception areas distinguishes auditory hallucinations and imagery

David E. J. Linden^{1,2,3}, Katy Thornton¹, Carissa N. Kuswanto¹, Stephen J. Johnston¹, Vincent van de Ven⁴, Michael C. Jackson^{1,3}

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While most humans are able to imagine the voices of familiar people, for some this becomes an uncontrollable perceptual experience, manifested as auditory verbal hallucinations (AVH). Although AVH are often thought to denote mental illness, the majority of voice hearers do not satisfy the criteria for a psychiatric disorder. Here we report the first functional imaging study of such benign hallucinations. We expected that the human voice area in the superior temporal sulcus (STS)¹ would be activated during both hallucinations and imagery because both entail vivid auditory experience. Other brain areas supporting both hallucinations and imagery included fronto-temporal language areas in the left hemisphere and their contralateral homologues, and the supplementary motor area (SMA). Hallucinations are critically distinguished from imagery by lack of voluntary control. We expected this difference to be reflected in the relative timing of prefrontal and sensory areas. Activity of the SMA indeed preceded that of auditory areas during imagery, whereas during hallucinations the two processes occurred instantaneously. The activation of the human voice area reveals for the first time for the auditory domain that brain regions that are sensitive to the social context of stimuli can be activated in the absence of external sensory stimulation. The voluntary control of the experience, which is lost during hallucinations, was represented in the relative timing of prefrontal and sensory activation.

Although AVH can be highly distressing and certain types are diagnostic of schizophrenia, many people who experience AVH do not suffer from mental illness. A recent review of hallucinations in the general population reported a median lifetime prevalence of 4%². It is likely that the majority of these experiences are benign and do not require treatment, and some people even find their hallucinated voices useful.³ The phenomenological form of benign and psychiatric auditory hallucinations is similar but benign hallucinations have less negative content, provoke less distress and are less disruptive.⁴ Although subclinical psychotic experience (hallucinations and delusions) may be a risk factor for developing psychosis^{5,6}, the outcome in most cases is favourable and not requiring treatment.

In the present study we assessed brain activity associated with benign hallucinations with functional magnetic resonance imaging (fMRI), using the blood oxygenation level-dependent (BOLD) signal as correlate of neural activity. We performed two control experiments, one where we asked participants to imagine other people talking to them at determined times, and one where we asked them to pace the auditory imagery themselves. We compared hallucination and imagery-related activation both against a resting baseline and against external stimulation with voice sounds. We did not contrast imagery and hallucinations directly because they could not be investigated in the same individuals (hallucinations were too frequent to allow for periods where we could test imagery in the benign hallucinators). However, we compared the temporal sequence of regional brain activation between the two groups.

In the first experiment, we investigated seven benign hallucinators who reported frequent, moderate to severe AVH and had no history of mental illness. They reported their spontaneously occurring hallucinations during fMRI by button press.⁷ For each participant the sequence of button presses was used as predictor variables for hallucination-related brain activity under a general linear model (GLM). The average duration of hallucination periods was nine seconds. To identify voice-selective areas for each participant, we performed a separate localizer experiment¹, which revealed higher activity for

voice than non-voice sounds in the bilateral STS for each participant (Suppl. Table 1, Fig. 1b). We used the STS areas of each participant as regions-of-interest (ROIs) and found significant activity during periods of auditory hallucinations (compared to baseline) as well (t(13)= 2.437, p=.03) (Fig. 1c). In a whole-brain analysis, we furthermore found a network of fronto-temporo-parietal areas that included language areas in the left hemisphere (Broca's area in the left inferior frontal gyrus [IFG] and Wernicke's area in the left planum temporale [PT]) and their right-sided homologues as well as prefrontal areas, primary motor cortex (associated with the button press), the bilateral cerebellum, the inferior parietal lobules, the thalami and bilateral areas along the STS and beyond the voice-selective ROIs (Fig. 1a, Suppl. Table 2). When we contrasted the activity during hallucinations with that during the external voice stimulation from the same participants, the parietal, SMA, cerebellar and thalamic activation remained significant, but not that of auditory cortex (Suppl. Table 2), supporting the view that overlapping auditory areas subserve hallucinations and the processing of sound. These findings coincide with previous reports of brain activity during periods of AVH in schizophrenia patients^{7,8,9}. The cerebellum may play a role in subvocalization¹⁰ or monitoring of self-generated speech, which have been suggested to be involved in the generation of hallucinations. The right inferior parietal cortex has been associated with the processing of external agency¹¹, which may be related to the experience of the voices as being externally generated.

We performed a second fMRI experiment, in which we tested whether activation of the human voice area could be obtained when participants engaged in voluntary imagery of speech. Seven different, healthy, non-hallucinating participants were instructed to imagine one or several familiar voices speaking to them for 21 periods of nine seconds each, thus mimicking the duration of the voices of the benign hallucinators. We again functionally localized voice-selective areas and performed both ROI and whole-brain analysis of imagery-related activity. The individually defined voice-selective ROIs along the bilateral STS (Fig. 2b, Suppl. Table 1) were significantly active during auditory imagery (t(13)= 3.594, p=.003) (Fig. 2c), similar to the finding for hallucinations. Activity during auditory imagery outside these ROIs included bilateral fronto-temporal networks and prefrontal cortex (Fig. 2a, Suppl. Table 3), conforming to areas activated during hallucination periods in the benign hallucinators. In contrast, we did not find activity in the inferior parietal areas and thalamus. In addition, there was prominent bilateral basal ganglia activation centred on the striatum and activity in the cuneus (possibly related to concomitant visual imagery).

Brain areas that showed increased activity during hallucinations thus overlapped to a large extent with those that showed activity during auditory imagery of voices. Although some degree of overlap was expected considering the similarity of the perceptual experience, we were interested in any neural differences that might explain the difference in subjective control, which is characteristically absent from the experience of hallucinations in all modalities. The genesis of such uncontrollable sensory experience may derive from an altered forward model.¹² Under normal circumstances, a forward model, whereby perceptual consequences are predicted on the basis of known actions, controls the experience of the consequences of self-generated actions, for example resulting in our inability to tickle ourselves.¹³ During speech production, SMA may be involved in monitoring of speech by modulating activity of auditory perception areas.¹⁴ When this modulation effect is impaired, for example through disturbed timing of activation between SMA and auditory areas, auditory perception areas may process covert speech as if it came from an external source, resulting in the hallucinatory perception of voices.¹⁵ To investigate this hypothesis, we analysed fMRI signal for differences in the relative timing of the evolution of the signal changes in the activated areas of both imagers and hallucinators using the BOLD latency mapping technique.¹⁶ We predicted a premature activation of auditory regions based on on the experience frequently expressed by hallucinators "that the voices express their thoughts before they have a chance to think them themselves." 17

During auditory imagery, SMA became activated first, followed by IFG and STS with a latency of 1-1.5 seconds (Fig. 3a&b, Suppl. Table 4). No such activation sequence was observed during hallucinations, where the onset of all these areas occurred at the same time (Fig. 3a&b, Suppl. Table 4). In order to exclude the possibility that these timing differences were caused by differences in instruction or response mode, we performed a further control experiment, in which participants were instructed to imagine voices without an external cue and to signal their on-and offset by button press with their right hand, similar to the hallucination experiment. Here again, SMA activity started significantly before the STS confirming the activation sequence as a main differentiating factor between imagery and hallucinations (Fig. 3a&b, Suppl. Table 4). The voice-selective area on the banks of the STS, which has not been previously localised in studies of auditory imagery or inner speech^{18,19}, was activated consistently during spontaneous auditory hallucinations and voluntarily controlled auditory imagery of voices. The voice area may contribute to the vividness and reality that distinguish hallucinations and imagery from internally generated thoughts that do not assume the quality of a sensory. How then can the human voice area become active in the absence of external acoustic stimulation? Spontaneous activation of higher sensory areas has been described in cases of sensory deprivation or during epileptic seizures. Local spontaneous activity may underlie certain types of hallucinations, for example visual hallucinations of Charles Bonnet syndrome²⁰ and possibly imagery of music without lyrics.²¹ However, spontaneous STS activity by itself may not fully explain the highly structured linguistic content of the reported hallucinations, which is likely derived from activity of fronto-temporal networks in the dominant hemisphere including Broca's and Wernicke's areas.²² Alternatively, activity may start in temporal cortex in some cases of pathological hallucinations^{23,24,25}, before spreading to other parts of the network, but our findings in the benign hallucinators do not conform to such a model.

In the case of auditory imagery, activity in the SMA complex preceded fronto-temporal activity. The SMA is part of a cortical complex that supports the planning of movements²⁶ but also the ideation of speech.²⁷ This sequence of brain areas conforms to a model where ideation and planning of the imaginary conversation precede the formulation of the content through speech (Broca's area) and the subsequent perceptual experience (human voice area in the STS). The early activation of SMA was not an artefact of different haemodynamic delay properties because medial frontal and superior temporal areas show similar latencies between onset of neural and BOLD activation.²⁸ During hallucination periods, the co-activation of SMA, VLPFC and STS was instantaneous, as far as can be judged by fMRI, which intrinsically filters out high frequencies. This suggests that, unlike imagery, they result from a spontaneous change in network properties rather than a directed top-down signal. Whether benign hallucinators, like schizophrenia patients, show deficient suppression of sensory areas during preparation of speech and motor acts²⁹, which could explain this instantaneous co-activation of premotor and sensory areas, will have to be a topic for future studies. Another striking difference between imagery and hallucinations⁹ may enhance frontal cortex activation through positive feedback loops and thus perpetuate activity in the fronto-temporal circuits generating AVH.

We used hallucinators who did not fulfil the criteria for a recognised mental disorder and, unlike most psychiatric patients with AVH, were not distressed by their voices. The advantage of this approach lies in the opportunity to study the perceptual phenomenon of AVH in a relatively pure form, without the concomitant effects of psychopathology (such as delusions) or medication. Differences between the brain mechanisms of clinical and non-clinical hallucinations will be the topic of future studies. One key difference may be the involvement of primary auditory cortex in pathological hallucinations^{7,30}, which may underlie their more imperative nature.

In conclusion, vivid auditory experience of human voices is associated with activation of the STS even in the absence of external auditory stimulation. We cannot tell from the involvement of the human voice area whether someone was hallucinating, imagining or hearing a physical voice. However, the wider network of activated brain areas and the sequence of activation reflect whether the experience is internally generated, and whether it is under subjective control.

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Figure 1: (a) The "hallucination" random effects map (voxels with supra-threshold F-values for the hallucination predictor (p<.05 at minimum cluster size=810 mm3), colored in pink) for the seven benign hallucinators, superimposed on one participant's anatomical scan in Talairach space. Here as in all following figures the left side of the image shows the left side of the brain. Sagittal views at x=-47 and x=53, coronal view at y=-11. IFG=Inferior frontal gyrus; SMA=Supplementary motor area; STS=Superior temporal sulcus. (b) The left and right panels show a composite map (the color bar indicates the number of participants with overlapping activation) of the individual "human voice area" clusters identified by the contrast between "voice" and "sound" predictors of the voice localiser experiment in the benign hallucinators (Sagittal views at x=-50 and x=53). Thresholded in individual participants at q(FDR)<.05. The middle panel shows the significant activation in the left (L) and right (R) voice area during hallucinations, as obtained by the ROI analysis.



Figure 2: (a) The "imagery" map (voxels with supra-threshold F-values for the auditory imagery predictor (p<.05 at minimum cluster size=1367 mm3), colored in green) for the seven control participants who engaged in auditory imagery, superimposed on one participant's anatomical scan in Talairach space. Sagittal views at x=-50 and x=50, coronal view at y=-11. (b) The left and right panels show a composite map (the color bar indicates the number of participants with overlapping activation) of the individual "human voice area" clusters identified by the contrast between "voice" and "sound" predictors of the voice localiser experiment in the auditory imagery participants (Sagittal views at x=-

50 and x=50). Thresholded in individual participants at q(FDR)<.05. The middle panel shows the significant activation in the left (L) and right (R) voice area during auditory imagery, as obtained by the ROI analysis.



Figure 3: (a) Latency maps. These maps show the sequence of activation (onset of the hemodynamic response, in seconds, red-yellow color coded) for key areas (SMA, IFG, STS) consistently activated across hallucinations and auditory imagery. Note that activity in these areas during hallucinations was instantaneous, whereas it started significantly (p<.05) earlier in SMA than STS for auditory imagery and in SMA and bilateral IFG than STS for self-paced auditory imagery. (b) Latencies for key areas shown in Fig. 3a and left motor cortex (IMC) plotted relative to the onset of activation in the left STS (ISTS), with 95% confidence intervals. AVH=auditory verbal hallucinations; AI=auditory imagery; Sp-AI=self-paced auditory imagery.

Tables:

	Left				Right			
	X	У	Z	Voxels	X	Y	Z	Voxels
H1	-47	-29	1	1074	50	-33	4	188
H2	-52	-27	-3	5122	56	-21	1	3471
H3	-53	-32	0	5304	59	-30	-3	4297
H4	-55	-40	-4	838	42	-31	6	1271
H5	-46	-32	-5	141	42	-37	1	346
H6	-45	-35	-3	517	54	-32	-2	1573
H7	-52	-30	0	38	58	-34	1	12
AI1	-61	-30	7	3846	58	-16	2	6472
AI2	-42	-49	20	340	51	-34	3	4505
AI3	-62	-17	-7	2901	58	-16	0	4648
AI4	-50	-20	-4	6172	51	-21	-2	6398
AI5	-58	-37	4	4960	59	-27	6	6456
AI6	-59	-21	1	2808	49	-18	2	3798
AI7	-52	-22	-2	2232	59	-43	16	4960

Table 1: Talairach coordinates for human voice area clusters of benign hallucinators (H1-7) and participants of the imagery experiment (experiment 2) (AI1-7)*

*The higher variability and lower average size of voice localizer activation in the hallucinatory group compared to the imagery group may be an effect of the attenuation of auditory cortex responses during ongoing hallucinations.⁵⁶

Table 2: Brain areas and	centre of mass Talairach	coordinates	for hallucination map	(p<.05, cluster
level threshold 810 mm ³)				

Area	X	у	Z	
Right hemisphere				
Ant. STS	54/46	-17/ -10	-8/ -14	
Middle STS	53	-31	-4	
Post. STS/ PT	58	-45	12	
TPJ	57	-45	30	
IPL/ PcG	50	-40	49	
IFG	49	18	9	
MFG	29	45	26	
PreCG	36	-18	51	
Thalamus*	16	-12	8	
Left hemisphere				
Ant./middle STS	-47	-27	-1	
Post STS/PT	-47	-45	6	
TPJ*	-46	-47	30	
IPL/ PCG*	-40	-41	46	
PreCG	-41`	-21	49	
PreCS	-34	-7	52	
IFG	-41	16	8	
MFG	-39	23	29	
Thalamus*	-9	-19	9	
Across midline				
SMA/pre-SMA*	0	6	49	
Cerebellum*	6	-58	-18	

*Areas that were also significantly activated for the contrast hallucinations vs. external voice stimuli (from localizer experiment), random effects analysis, thresholded at p<.05 (cluster level threshold 1016 mm³).

Abbreviations: I(M)FG = inferior (middle) frontal gyrus; IPL = inferior parietal lobule; PCG = postcentral gyrus; PreCG(S) = precentral gyrus (sulcus); PT = planum temporal; SMA = supplementary motor area; STS = superior temporal sulcus; TPJ = temporoparietal junction.

Table 3: Brain areas and centre of mass	Talairach coordinates	for auditory	imagery map	(p<.05, cluster
level threshold 1367 mm ³).				D (2)

Area	X	У	Z	
Right hemisphere				
Middle STS	43	-30	4	
Post. STS/ PT	58	-41	14	
Cerebellum	34	-61	-18	
IFG	46	14	5	
Striatum	19	7	6	
Left hemisphere				
Middle STS/PT	-54	-34	9	
TPJ	-53	-39	23	
SMA/pre-SMA	-5	13	49	
IFG	-46	20	9	
MFG	-39	5	48	
Striatum	-17	4	8	
Across midline				
ACC	-2	22	26	
Cuneus	-1	-55	0	

Abbreviations: ACC = anterior cingulated cortex; otherwise see Table 2.
Table 4: Onset latency parameters for latency maps of hallucination (H), auditory imagery (AI) and self-paced auditory imagery (SAI) episodes (values in seconds with 5% confidence interval [CI]). Areas with activation onsets significantly earlier than STS are marked in bold face.

Area	H (CI)	AI (CI)	SAI (CI)
SMA	2.488890 (±0.711546)	1.962071 (±0.438666)	1.194594 (±0.810784)
Left IFG	2.341574 (±0.632921)	2.891307 (±0.458788)	1.528571 (±0.712535)
Right IFG	2.173036 (±0.478018)	2.683336 (±0.526618)	1.528570 (±0.888897)
Left STS	2.464708 (±0.609961)	3.071157 (±0.504174)	3.006249 (±1.276447)
Right STS	2.803950 (±0.746570)	3.345196 (±0.533755)	3.144117 (±1.229023)
Left MC	2.332956 (±0.558350)	N/A	3.240624 (±1.280586)

Abbreviations: MC = motor cortex; otherwise see Table 2.

Methods:

Participants:

a) Benign hallucinators

The benign hallucinators were assessed with the Positive and Negative Syndrome Scale (PANSS)^{S1} and their mean scores were 12 for positive symptoms (range 10-14), 7 for negative symptoms (range 7-8) and 18 for general psychopathology (range 16-22). The group's mean score for PANSS Hallucination was 5, indicating that the group's hallucinations were moderate-severe. The mean length of time since onset of hearing voices was 26 years (range 3-58). Five participants described their voices as spirits of people who have died (H2, H4-7), one participant described her voices as the result of telepathy with living creatures (H1) and one final participant (H3) did not view her voices as real entities but as a product of her creative brain. No participant was distressed by their experiences and all described neutral conversations with second person voices whilst being scanned. We measured their attitude towards their voices with the revised Beliefs About Voices Questionnaire (BAVQ)^{S2}. They scored 0.5 for malevolence (possible range 0-18, thus our group is close to the minimum), 12 for benevolence (scale max.18, thus mostly benevolent voices), 5 for omnipotence 0-18 (scale max. 18, thus voices were not judged as very powerful), 3 for resistance (scale max. 27, thus voices were hardly ever resisted) and 17 for engagement (scale max. 24, thus mostly voices were engaged).

None of the hallucinators were taking (or had previously taken) antipsychotic medication. Benign hallucinators experienced on average 21 periods of hallucinations (7 per scanning run) with a mean duration of 9 seconds during a session.

b) AI participants

The most commonly reported strategy for the auditory imagery experiment was imagining the voices of familiar people, such as family members in conversation or leaving phone messages.

fMRI:

We used a gradient echo EPI (echo-planar imaging) sequence for functional imaging (20 slices of 5mm, no gap, in-plane voxel size 3mmx3mm, slice thickness=5mm, TR=1.5s, TE= 30ms, 220 time points). For the voice area localiser (stimuli courtesy of the Voice Neurocognition Laboratory at the Dept. of Psychology, Glasgow University http://vnl.psy.gla.ac.uk/resources_main.php), 15 second blocks of human non-speech voices (V) alternated with non-human sounds (S) and rest (R) to yield eight blocks of each condition per run in the following manner: RSVSVRVSVSR etc.

Although the localiser procedure for the temporal voice area was initially developed for sparse sampling with a TR of 10s, it is also possible with continuous sampling against the background of the scanner noise. Stimuli were presented using the E-prime software package (Psychology Software Tools, Philadelphia, USA) and delivered through the scanner's headphone system at maximum output. All participants reported comfortably hearing the stimuli even in the presence of scanner noise.

Data analysis:

fMRI data were preprocessed with the Brainvoyager software (Brain Innovation, Maastricht, the Netherlands). We corrected for head movement with three-dimensional motion correction, removed linear trends, and filtered data temporally (high pass: 3 cycles per run; Gaussian temporal filter with 2.8s Full Width at Half Maximum, FWHM) and spatially (Gaussian filter with 4mm FWHM). We applied no temporal high pass filter to runs with fewer than 6 periods of hallucinations in order to preserve signals of interest. We aligned functional with anatomical data sets and transformed both into Talairach space, using a 12-point rigid body transformation. We analysed the functional data for hallucination and imagery runs statistically with a general linear model with the "voice" predictor as effect of interest and the six parameters from the motion correction in Cartesian space as nuisance variables. The voice predictor was constructed by convolving a boxcar function with the value "1" for time points with hallucinations/imagery and "0" for all other time points with a general linear model with the predictors "voice stimulus" and "sound stimulus" and the six motion correction parameters. The

predictors "voice stimulus" and "sound stimulus" were constructed by convolving boxcar functions assuming the value "1" for the voice or sound blocks and "0" for the remainder of the run with the hemodynamic reference function. We identified the human voice area with the contrast "voice stimulus" vs. "sound stimulus" following the procedure of Belin¹. Voxels were accepted as significantly activated if they exceeded a criterion threshold of p < .05, corrected for the False Discovery Rate, FDR).

For the hallucination experiment, we computed a random effects multi-subject general linear model across all 7 participants. For the auditory imagery experiment, we computed a random effects multi-subject GLM across all 7 participants. Effects were thresholded at p<.05 (corrected at cluster level, applying the iterative cluster threshold correction implemented in Brainvoyager^{S3}, applying 1000 iterations. For the self-paced auditory imagery experiment, we computed a fixed effects GLM, thresholded at p<0.05, FDR corrected.

For the region of interest analysis, we used the voice area clusters identified by the localiser experiment and extracted the beta values of the voice predictor for the hallucination and auditory imagery experiments for individual subjects. We tested for differences against baseline with a one-sample t-test.

We estimated the latency of activation onset in individual areas for single trials of the unsmoothed time courses, using the BOLD latency mapping plugin in Brainvoyager. BOLD latencies are estimated according to a piece-wise linear (trapezoidal) model fit of the event-related response^{S4}, yielding the parameters onset time, amplitude and duration for a parsimonious description of single trial time courses^{S5}, with 95% confidence intervals.

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