Attachment and Interpersonal Processes in Hearing Voices

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Overview

The empirical paper in part two of this thesis investigates the role of adult attachment anxiety and avoidance, interpersonal processes, beliefs about voices and paranoia in the relationship voice hearers have with their voice. Results suggested that there was an association between attachment, interpersonal processes and distress related to hearing voices. Some preliminary mediational analyses are presented which suggest that the relationship between attachment and voice related distress may be mediated by voice related variables and paranoia. The literature review in part one takes the form of a “review of reviews” and considers recent advances in hearing voices research in the neuroimaging and psychological fields. This literature is then considered within a relational framework in an attempt to integrate and synthesise findings from different disciplines. Part three of the thesis is a critical review of the empirical research.

Contents

List of Tables and Figures

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Part 1: Literature Review

Hearing voices: “A review of reviews”

Abstract

Aims: This review aimed to examine recent evidence relating to the phenomenon of hearing voices across different levels of evidence and explanation from neurological to psychological, in the form of examining recent review articles with the hope of gaining an overview of the area and a sense of the strength of the evidence.

Methods: A systematic search of the Medline and Psychinfo databases was conducted, focusing on review articles on hearing voices from the year 2000 onwards. Articles were included that reported on a systematic search of the literature within the methodology.

Results: The search strategy yielded a total of 24 review articles which fell broadly into neurological explanations and psychological explanations. The areas of evidence are summarised and discussed in light of methodological difficulties.

Conclusions: The strongest evidence relating to hearing voices seems to be an inner-speech account and this is discussed in light of different theories that account for it. Results from the review are discussed in light of clinical implications and suggestions for areas of further research are made.

1. Introduction

Auditory verbal hallucinations (AVHs) or 'voices' are considered by some to be a prominent symptom of schizophrenia, with up to 70% of patients diagnosed with schizophrenia experiencing them (Landmark et al., 1990). Voices are defined as a sensory perception that has a compelling sense of reality, but which occurs without stimulation of the sensory organ (American Psychiatric Association, 1994). However the view that hearing voices are always a symptom of a mental illness has been widely challenged. One prominent psychological commentator, Bentall (2006), suggests that due to a lack of diagnostic utility, the concept of Kraeplinian schizophrenia should be abandoned and a "complaint-oriented" approach adopted. This, along with evidence that psychotic symptoms in general exist on a continuum rather than being categorical (Johns & van Os, 2001; Stip & Letourneau, 2009), and the view that hearing voices is an experience that one may have outside of the bracket of "mental illness" (Choong et al., 2007) have encouraged an understanding of the experience in its own right. Indeed, some have argued for a reclassification of hearing voices as a dissociative experience, outside of the realm of psychosis (Moskowitz & Korstens, 2008).

There have been a number of theories of AVHs suggested in the literature, from those that see voices as an epiphenomenon of disturbed brain activity, to those that explore the complex psychological factors involved in the experience. Source monitoring accounts assume a dysfunction of the processes involved in distinguishing whether an internal event (e.g. memory, belief) is attributed to an internal or external source (Laroi & Woodward, 2007). A related although conceptually different theory underlying AVHs is one of inner-speech, whereby it is assumed that one's inner-speech is externally attributed. Different authors have accounted for this in different ways, with neurological explanations focusing on a dysfunction in the feed-forward signal in the brain system which monitors inner-speech (Frith, 1992). However, Fernyhough (2004) has adopted a Vygotskian

developmental approach to inner speech and AVHs. Others have argued that central to the experience are processes of inhibition control and context memory (Waters et al., 2006).

Perhaps more of a maintenance account, cognitive (neo-Beckian) theories have argued for the centrality of beliefs about voices, including omnipotence, malevolence and benevolence, as factors that influence the distress resulting from the experience (Chadwick & Birchwood, 1994). By giving the voice at least partial 'personhood', some theorists have suggested relative social rank underlies this relationship (Birchwood et al., 2004), or that interpersonal dynamics from the voice-hearer's social sphere are influential (Hayward, 2003). Sorrell et al. (2010) have provided evidence that relating to the voice from a position of distance is associated with distress in a clinical sample, although it was suggested this relationship was mediated by beliefs about voices. Non-clinical voice hearers tended to relate to their voices from a closer position and experienced less distress.

When seen as symptomatic of a psychotic illness, most voice-hearers receive neuroleptic medication. However, despite this, around 25 – 50% still experience treatment resistant voices (Panteliss & Barnes, 1996). Reducing the distress associated with voices is a common therapeutic target of cognitive behavioural therapy for psychosis (CBTp) and treatment effects have been widely reported in this domain (Pilling et al., 2002). Recent trends have seen a move away from more traditional CBT approaches to third wave approaches, including mindfulness and acceptance and commitment therapy (Alvarez et al., 2008).

Given the diverse nature of theories of AVHs, and the recent surge in publication of reviews relating specifically to the phenomenon of hearing voices, it was felt that what may be missing from the existing literature was a 'review of reviews'. Consequently, this review aims to examine systematically the different levels of evidence from neuroimaging to psychological explanations, and to attempt to examine the strength of this evidence. In addition, this review aims to try and

synthesise the different levels of evidence for hearing voices within a relational framework.

2. Method

An electronic search of Ovid MEDLINE and PsychINFO was performed, including review papers on hearing voices published between 2000 and March 2012. Reference lists of papers were also searched manually to find further relevant papers. Titles and abstracts of papers were searched using the search terms "hearing voices", "auditory hallucinations" and "auditory verbal hallucinations", whilst limiting the results to review papers, in line with the aims of this review. Papers were only included if they were written in the English language. In the interest of maintaining a robust picture of the current evidence and levels of explanation, only review articles that reported a systematic search were included. The search strategy yielded a total of 24 papers to be included in this review. The papers fell broadly into six categories: 1) prevalence in the general population (1 paper)[1], 2) assessment tools (1 paper)[2], 3) command hallucinations and the link with dangerous behaviour (2 papers), 4) structural and functional brain imaging (10 papers), 5) psychological explanations (8 papers) and 6) treatment (3 papers).

3. Results

3.1 Structural Imaging

Allen et al. (2008) conducted a systematic review on structural brain differences in those who hear voices. They report on 18 studies between 1990 and 2006, mostly in schizophrenia samples. The most consistent finding across the studies reported is a reduced grey matter volume in the left superior temporal gyrus

[1] Beaven et al. (2011) reviewed prevalence in of hearing voices in the general population. The scope of this review was large and was not considered further as it was felt too large to cover in this review.
[2] Ratcliff et al. (2011) reviewed assessment tools. Again this was not considered further in this review as its scope was too large to do it justice in a brief review format.

(STG), which includes the primary auditory cortex (although it is noted that there have been studies that have not reported this effect). In addition to grey matter reductions in the auditory cortex, four studies evidence grey matter volume reductions in non-sensory areas, including the prefontal cortex and the cerebellar cortex. It is suggested that these may be associated with the monitoring and awareness of internal speech. Allen et al. also comment on the evidence of cerebral asymmetry in schizophrenia specifically related to AVHs, and report that the evidence is inconclusive.

Subsequently, Palaniyappan et al. (2012) conducted a meta-analysis of structural brain imaging studies of hearing voices in schizophrenia. They suggest that the majority of previous studies looking at brain structure and hearing voices use a Region of Interest (ROI) approach, which is driven by specific hypotheses regarding the involvement of the temporal cortex. This method may overlook other areas of the brain associated with hearing voices. Using data from 350 participants across seven studies with whole brain imaging, they suggest that there were no areas of increased grey matter related to hearing voices, but there were areas of reduced grey matter volume in the bilateral insular, the right STG and Broca's area (language areas). Palaniyappan et al. suggest that the frontoinsular cortex is a part of the Salience Network, a region involved in integration of internally and externally generated sensations, and that dysfunction in the insular may lead to a difficulty in evaluating internal speech with regard to its context, and inappropriate allocation of salience to internal speech (Paliniyappan and Liddle, 2012a). Of note, the sample in this meta-analysis consists entirely of schizophrenia patients whose AVHs persist despite medication, and does not necessarily apply outside of this somewhat limited sample. The observed neural correlates may be indicative of voice persistence, rather than a tendency to hear voices per se; or indeed are an effect of long-term neuroleptic medication (Beng-Choon et al. 2011).

3.2 Functional Imaging

Woodruff (2004) reviewed the neuroimaging literature on hearing voices. He starts from the premise that voices are perceived and that regardless of their origin, the brain systems involved in auditory perception must be involved in hearing voices. Linked to Nayani and David's (1996) phenomenological survey of the experience of hearing voices, Woodruff posits several key areas thought to be central to hearing voices, and draws on neuroimaging as evidence. Consequently, a number of functional domains in the brain are implicated. First, along with structural imaging implicating the temporal cortex (particularly the STG), Woodruff sites 9 functional imaging studies that support the involvement of the temporal cortex and language areas. Woodruff advances the "saturation hypothesis" (Woodruff et al., 1997), whereby there is competition for resources in the temporal cortex between internally generated and external speech. Consistent with this account, are the involvement of brain areas implicated in language and speech perception in AVHs. Woodruff also implicates the temporal cortex in terms of its responsivity to auditory stimuli and the effects on attention, suggesting that the STG is central to the neural processing of socially salient auditory information, and that perhaps differences in function in this area may lead to a tendency to respond preferentially to certain types of speech. For example, altered sensitivity to emotional intonation or innuendo may lead to a predisposition to auditory hallucinations. Woodruff also suggests that other brain areas, including the thalamus and anterior/posterior cingulate, which are implicated in conscious awareness of auditory information, may trigger the experience of hearing voices, which are then processed in the language areas. Further, Woodruff comments on the apparent reality of voices, citing evidence that the primary sensory auditory areas are activated during the experience of hearing

voices. It is assumed that this contributes to the realness of the voices, in contrast with auditory imagery, which does not always activate the primary sensory area (D'Esposito et al., 1997) but rather the frontal lobes. This suggests a more effortful experience in auditory imagery in contrast to the usually passive reception of AVHs. In terms of the role of emotional responses to AVHs, the insula may act as a relay station between the limbic system and frontotemporal areas, particularly the MTG, which is implicated in verbal self-monitoring. Finally, Woodruff suggests there may be evidence that reduced connectivity between the dorsolateral prefrontal cortex and language areas (MTG/STG) leads to increased severity of voices (Lawrie et al., 2002). In sum Woodruff's paper provides an interesting overview of functional imaging research up to 2004, and is presented first for this reason. However it is difficult to assess the strength of the evidence from its presentation, given that there is no comment on the statistical methods or strength of associations in the studies he cites. Further, the evidence cited is largely in samples of people diagnosed with schizophrenia, raising a question of the generalizability of the results to non-clinical voice hearers.

Jardri et al. (2011) conducted a meta-analysis of ten positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) studies during AVH experiences in schizophrenia. They hypothesise that hearing voices may be linked to a number of brain regions and an interaction between a wide cortical network. The meta-analysis revealed increased activation most strongly in Broca's area, the precentral gyrus, and the insula. They suggest that this activation supports reduced lateralisation of language function in schizophrenia, possibly linked to hearing voices (Sommer et al., 2001). Further, the left MTG and STG were found to have increased activity, as well as the inferior parietal lobule (part of Wernicke's area in the left hemisphere), and the left hippocampus/parahippocampus. The latter area is involved in forming new memories of autobiographical events, as well as being connected widely to cortical

areas, including the language areas. The authors hypothesise that this provides evidence for the role of episodic memories of speech and a plausible role for memory retrieval in hearing voices. Whilst they did not find support for the brain regions involved in a source monitoring account of hearing voices, (e.g. supplementary motor area, anterior cingulate), they do not rule this out, suggesting that it may be a cognitive bias that is present independently of the state of hearing voices. Based on the areas activated, they suggest unbidden auditory memories activate verbal areas of the auditory cortex but that as the "self-tag" is missing from the sensory experience, it is experienced externally. Again, the sample in this analysis of people who were diagnosed with schizophrenia or related difficulties means the generalizability to non-clinical populations is questionable. Further, the authors point out that they were not able to control in their analysis for age or medication status, leading to possible confounds.

3.2.1 Inner Speech

Allen, Aleman & McGuire (2007) conducted a systematic review of the neuroimaging and behavioural literature on inner speech models of hearing voices. However, the authors do not report specific search terms leading to a question about the completeness of the search undertaken. They report on 7 behavioural studies published between 1996 and 2007 which explicitly tested an inner-speech hypothesis. Broadly, the research paradigm in these studies is one where, assuming a deficit in self-monitoring, participants are played back distorted versions of their own voice whilst speaking, and asked to comment on the source of the speech they hear, the assumption being that a deficit in self-monitoring will lead to reliance on the external distorted feedback and hence an external attribution. Allen et al. suggest that there are in fact mixed results from behavioural studies of inner-speech, pointing out that this may be linked to the experimental methods used, in particular, a reliance on evaluating degraded or delayed stimuli, which may point to

a deficit in this area rather than a deficit in the self-monitoring of inner speech. The behavioural studies also suggest that the tendency to misattribute the source of inner speech may be linked with delusions or positive symptoms more generally.

However, Allen et al. report more convincing evidence for an inner-speech account of hearing voices from the 7 neuroimaging studies they review, conducted between 1995 and 2007. The studies reported use a similar research paradigm to the behavioural studies discussed above, but include functional imaging to elucidate potential brain areas involved. Aleman et al. suggest that the generation of inner speech is associated with speech production areas (the inferior prefrontal cortex and insula), whilst auditory verbal imagery and monitoring of inner speech are associated with the superior temporal cortex and a more distributed network of cortical and subcortical regions. Further, source misattribution appears to be associated with activity in the lateral temporal cortex and the anterior cingulate cortex. This is taken as evidence to support a corollary discharge hypothesis of hearing voices (e.g. Frith & Done, 1988), whereby, under normal conditions, generation of inner-speech in the frontal cortical regions is accompanied by a feed forward signal to temporal areas involved in speech perception. This feed forward signal is thought to signal to the speech perception areas that the incoming signal is self-generated; with hearing voices it is assumed that a dysfunction in the feed forward signal leads to inner speech being experienced as non-self in origin. Again, a lack of non-clinical voice hearers in the studies outlined in this review would suggest that the results are not generalizable to this group.

3.2.2 The Neural Substrates of Speech

Stephane, Barton & Boutros (2001) conducted a systematic review of the neuroimaging literature specifically focusing on the links between hearing voices and dysfunction in the neural substrates of speech. They report on 24 studies of

people diagnosed with schizophrenia. Unfortunately, the sample sizes in the studies are generally quite low, raising questions about the generalizability of the results. A possible consequence of this are the diverse brain regions implicated in the experience of hearing voices, although it is possible this is linked with methodological problems in the studies cited. However, a relatively consistent finding across the functional imaging studies in this review is the role of the left STG, and therefore speech perception. Stephane et al. therefore suggest that hearing voices involves a diverse neural network with Wernicke's area (STG) as a common final pathway in the experience. Consequently, this review provides some support for an inner-speech model of hearing voices, and makes the suggestion that inner-speech and external speech have the same underlying neural substrates. Again this review is limited to studies of people diagnosed with schizophrenia and does not include non-clinical voice hearers.

3.2.3 Paradoxical Activation of the Primary Auditory Cortex

Kompus et al. (2011) conducted a meta-analysis investigating the paradoxical engagement of the auditory cortex in hearing voices. The authors suggest that this paradox may be the consequence of on-going neural excitability in the auditory cortex, leading to endogenous experiences (voices) prevailing, with exogenous auditory stimuli being incapable of generating further neural excitation to overcome the existing excitation. Kompus et al. therefore conducted a meta-analysis comparing fMRI and PET studies measuring activation in the auditory cortex in endogenous studies (hearing voices in absence of auditory stimuli) and exogenous studies (hearing voices in presence of auditory stimuli). They identified 12 studies involving hallucinating participants experiencing voices and then resting in the absence of auditory stimulation, and 11 studies comparing people with a diagnosis of schizophrenia and control groups during auditory stimulation. The results of the meta-analysis support the hypothesis of the paradoxical increase of activation in the

auditory cortex during hearing voices with a decrease in activation when hearing voices in the presence of external stimuli. During endogenously evoked processing, there was an increase in activation in the left STG, the left insula, the left posterior hippocampus, the right MTG, the right inferior parietal lobule, the opercular part of the right inferior frontal gyrus and the rostral portion of the right superior frontal gyrus. During exogenously provoked processing participants diagnosed with schizophrenia showed reduced activation in the left STG and the left primary auditory cortex, along with the anterior cingulate cortex, the rostral portion of the superior frontal gyrus and in areas close to the posterior hippocampus (left thalamus and right retrosplenial cortex).

The authors suggest their results point to an increased spontaneous internal activation, and a decreased activation to external stimuli whilst hearing voices. It is hypothesised that top-down processes do not filter out internal streams of information. The rostral prefrontal cortex is associated with attentional switching between internal and external information (Gilbert, Frith & Burgess, 2005). Kompus et al. suggest that the paradoxical activation in this area observed in their analysis provides further evidence of a bias in those who hear voices to internal over external stimuli. In contrast to an external attribution bias (e.g. McGuire et al., 1995) the authors put forward an attentional switching hypothesis, suggesting that mental events compete for attentional resources in order to reach consciousness, and that normally inhibited internal events can become uninhibited, and break through into consciousness in the form of voices at the expense of attention to external stimuli. They also suggest that the role of the primary auditory cortex in hearing voices explains why voices are heard and perceived as real.

Kompus et al. point to a number of limitations of the analysis. First, reduced activity in people diagnosed with schizophrenia may reflect reduced grey matter, or indeed, the comparison between a baseline task and the auditory task may only point to an increase in activity during the baseline task. Further, increased

spontaneous brain activity in the auditory cortex can be observed in those who do not hear voices and the observed brain activations may also be activated in response to hearing a voice, rather than resulting in hearing voices. It is also of note again that this analysis primarily concerned people diagnosed with schizophrenia, therefore compromising the generalizability of the results to non-clinical voice hearers.

3.2.4 State and Trait

Kuhn and Gallinat (2010) conducted a meta-analysis of state and trait aspects of brain function in schizophrenia AVHs. They divided studies looking at brain function into those that compared periods of presence and absence of voices in the same individuals (state studies) and those that compared people who were hearing voices with those who did not (trait studies). For the state analysis, 10 studies comprising 85 patients were included; the trait analysis used 8 studies of 189 participants. The state analysis revealed increased activation whilst hearing voices in the bilateral inferior frontal gyrus (IFG) encompassing Broca's area, the bilateral postcentral gyrus and in the left parietal operculum (part of the left inferior parietal lobule). In the trait analysis, there was significantly lower activation in the left STG, left MTG, anterior cingulate gyrus, and the left premotor cortex, in people who heard voices when compared to those who did not. There were no areas of increased activation. Kuhn and Gallinat suggest that the differences in activation between the state of hearing voices and the trait, reflect that the momentary experience of hearing voices can be associated with brain areas related to speech production, which coincide with a more permanent alteration in the activity of the temporal cortex, involved in speech perception. They posit that activity in the IFG is related to inner-speech, often advanced as underlying AVHs (McGuire et al., 1996). Kuhn and Gallinat suggest that the state like production of inner speech is misidentified by

more permanent speech perception distortions in the temporal lobe. It is worth noting that Kompus et al. (2011) take their evidence of both increased and decreased activation in the primary auditory cortex (see above), as implicating a shared neural underpinning in terms of state and trait, not different mechanisms as suggested by Kuhn and Gallinat.

3.2.5 A System for Social Perception and Communication

Wible, Preus & Hashimoto (2009) conducted a review of the functional imaging literature on symptoms of schizophrenia. The authors suggest that there is increasing evidence that the speech perception areas in the brain (implicated in hearing voices in the above sections) are in fact adjacent to or overlapping with areas that are involved in social perception and that they act as an integrated system (Decety & Lamb, 2007), within the temporal parietal junction (TPJ). They suggest that speech and social perception systems not only overlap within the TPJ, but that multimodal information (auditory, visual and somatosensory) from this region can influence processing of auditory, visual and somatosensory information. The authors suggest that when hearing voices, there is not only phonemic and semantic processing, but also a social experience, as each voice typically has qualities of personhood (identity, personality etc). In studies of normal language processes, the superior temporal sulcus (STS), residing in the TPJ, whilst being involved in speech perception, also appears to be involved in face or person recognition (Gobbinni & Haxby, 2006), and hence a representation of another person who is speaking. Wible, Preus & Harashimoto suggest that one possibility is that the activation of the STS during inner speech may lead to a perception that someone else is speaking and hence to the experience of hearing voices, via a feed forward signal to the primary auditory cortex. Further, the TPJ region of the brain has been implicated as a social brain region, including functions of theory of mind and agency. It has also been suggested that this area is involved in self-other

distinctions (Blanke & Arzy, 2005). Whilst it is difficult to get a sense of the strength of the evidence presented within this review at an individual study level, what is most striking here is the implication of a system in hearing voices that not only includes language areas, but also areas that are involved more broadly in social perception and self/other representation, perhaps giving evidence at a neuro-scientific level to a more relational view of hearing voices.

3.3 Psychological Explanations

3.3.1 Auditory Imagery, Unanticipated Speech and Deceptive Memory

Seal, Aleman & McGuire (2004) systematically reviewed the evidence on auditory imagery, verbal self-monitoring, and episodic memory in AVHs. The authors review 13 papers (from 1938 to 2004) investigating auditory imagery and find no evidence for a link to AVHs. They suggest mixed evidence for poor verbal self-monitoring in schizophrenia based on six small studies since 1996. They suggest the best evidence is for an externalising bias: Allan et al. (2003) asked voice-hearers to rate the origin of pre-recorded tapes of themselves, in either normal or distorted form. Those who heard voices were more likely to externally attribute the source of their own voice, despite verbal self-monitoring not being manipulated, suggesting that an account of hearing voices which focuses on verbal self-monitoring alone lacks explanatory power.

Seal, Aleman & McGuire also review 16 studies linking a breakdown in source memory to hearing voices. They suggest that a disturbance in the reconstruction of episodic memories may be pertinent. As samples are small, use different memory paradigms and are of limited statistical detail it is hard to assess the strength of the results based on this review. More consistent findings are reported in source memory studies, with those who hear voices being impaired in discriminating between their own speech and that of another. This is not a universal finding however (e.g. Morrison & Haddock, 1997), and has also been accounted for

by premorbid IQ and overall verbal memory function (Seal, Crowe & Chung, 1997). The authors suggest there is no convincing evidence of a deficit in specific source memory reconstruction in people diagnosed with schizophrenia, but a more general problem with episodic memory (Aleman et al., 1999) related specifically to self-generated speech. The authors comment on the similarity of this finding with the verbal self-monitoring studies described above, and suggest that the deficit in memory of self-generated verbal material may be a consequence of the impairment in self-monitoring of inner speech.

Seal, Aleman & McGuire account for the apparent deficit in verbal self-monitoring by drawing on the work of Wolpert et al. (1995) on intentional motor control. They suggest that when inner speech is produced, there is distortion of the feed-forward signal normally present which tags the experience as internal, leading to a mismatch between the actual sensory experience of inner speech and that expected, resulting in AVHs. They also suggest that top-down factors, including mood, expectations, appraisals of the voice, response bias, and presence of a delusional framework may all affect the specific experience. They suggest that predisposing factors, such as depression or isolation are important too. A significant strength of this model is that it combines both a neuropsychiatric and cognitive framework in understanding the genesis of hearing voices, with inner speech as a central component (see Allen et al., 2007, above). Importantly, this model is necessarily restricted to schizophrenic AVHs, or at least requires considerable modification (and additional evidence) to cover the continuum of voice hearing experiences.

3.3.2 Source Monitoring

Dittman & Kuperberg (2005) also systematically reviewed the literature on source monitoring and AVHs, specifically to examine the hypothesis that those who hear voices misattribute internally generated thoughts to externally perceived

voices, termed reality monitoring. They present evidence from 35 studies between 1948 and 2004 which have investigated, and largely support, changes to source monitoring. Whilst paradigms studying delayed source memory provide somewhat mixed results, results from immediate and online source memory have reported more consistent difficulties in source monitoring. Interestingly, the external attribution of internal mental events appears to be most evident when the items are high in emotional content, supporting a view of hearing voices whereby what is externalised is content inconsistent with a person's metacognitive beliefs (e.g. Morrison, Haddock & Tarrier, 1995). A strength of this review is the inclusion of some studies of people who hear voices from different diagnostic categories, perhaps supporting a complaint-oriented approach (Bentall, 2006), although Ditman & Kuperberg appear to favour a more diagnostically driven approach as they emphasise the need for future studies to focus exclusively on people diagnosed with schizophrenia . The authors also suggest that the different definitions of "hallucinator" and "non-hallucinator" across the studies reviewed may account for mixed results. Despite comment on methodological issues, there is no report of any statistical information in the review and as such is difficult to get a sense of the strength of any of the results in the studies.

3.3.3 Self Recognition Deficits

Waters et al. (2010) conducted a meta-analysis of what they term self-recognition deficits in schizophrenia-based AVHs. They suggest that the different explanatory frameworks for hearing voices, for example, inner-speech and the feed-forward model (see above), source monitoring (see Dittman & Kuperberg, 2005) and theories of mental imagery (e.g. Mintz & Alpert, 1972), all have a shared commonality in proposing a deficit in recognising self-generated mental events. Further, they argue that the studies employed to test these different explanations all

have a common characteristic, that is, participants have to make a judgement about whether an action was internally generated or not.

For this they draw on 23 studies where performance was tested on both self-generated items and memory of new (external) items that compared “schizophrenia vs healthy control” (789 patients and 581 controls). Nine studies met criteria for inclusion for an AVH vs non-AVH comparison within the schizophrenia group, (150 vs. 165). Comparisons of self-recognition between those diagnosed with schizophrenia and healthy controls found poorer self-recognition in those diagnosed with schizophrenia, with a moderate to large effect size. The analysis also suggested that those diagnosed with schizophrenia had poorer performance on new item recognition (the external control condition), with a small to moderate effect size. Self-recognition was also poorer in those patients who heard voices than those that didn’t, with a moderate effect size, though new item recognition did not differ). The fact that the patient group did not differ on new item recognition regardless of presence or absence of voices, suggests a specific deficit in self-recognition in the experience of hearing voices. The authors suggest that a self-recognition deficit is part of a system of intentional and controlled processing, rather than a more automatic perceptual system. They conclude that their analysis provides strong evidence for a self-recognition deficit in hearing voices, which can account for the alien nature of the voice hearing experience. Once again, this analysis did not include any non-clinical voice hearers.

3.3.4 Hearing Voices in Psychotic and Non-Psychotic Groups

Badcock & Hugdhal (2012) conducted a systematic review of the cognitive mechanisms of hearing voices in psychotic and non-psychotic groups. The authors point to the recent debate around psychotic symptoms in general being on a continuum, but draw attention to recent reviews that have questioned the continuum approach (e.g. Sommer, 2010). Badcock and Hughdhal point to the

phenomenological similarities and differences in the voice hearing experience between clinical and non-clinical groups, suggesting that similarly there may be both shared and differing cognitive mechanisms involved across these groups of people. They review relevant literature on differences between clinical and non-clinical voice hearers across four models of voice hearing (intrusive cognitions, source memory, inhibition and lateralization).

In sum, Badcock & Hugdhal suggest evidence for some shared cognitive mechanisms in clinical and non-clinical voice hearers (increased intrusive cognitions, poor inhibitory control) indicative of a continuum model of psychosis. However, differences in source memory and lateralisation of language were found to be more unclear, and possibly linked more to hearing voices in psychosis. A considerable strength of this review is its attempt to unpick some of the similarities and differences across clinical and non-clinical groups. However, there is little comment made in the review on methodological factors of the studies included (e.g. sample size, statistical methods, strength of any results), meaning that is difficult to assess the strength of the evidence presented. It would seem however that the similarities and differences suggested warrant further research enquiry.

3.3.5 Cognitive Appraisals of Voices and Distress

Mawson, Cohen & Berry (2010) conducted a systematic review examining the relationship between cognitive voice appraisals and distress. They include 26 quantitative studies published between 1990 and 2008 that specifically examine the link between distress and cognitive appraisal of voices, in samples of people diagnosed with schizophrenia spectrum disorders. A robust finding is reported of an association between voice malevolence and distress (e.g. Birchwood & Chadwick, 1997), as well as depression and anxiety. Most studies reported that voice malevolence was independent of other factors in predicting distress, such as voice frequency. The authors also report a relationship between voices appraised as

benevolent with lower distress, depression and anxiety, and state plausible methodological limitations in studies where this association was not observed. Voice supremacy (voices appraised as intrusive, controlling and dominant) was also observed to be associated with distress, depression and anxiety, and found to be an independent predictor of distress when entered into regression analysis (Gilbert et al., 2001). Mawson, Cohen & Berry also point out that there is a suggested relationship between social schemata, voice appraisals and distress (Birchwood et al., 2004). They also report on voice acquaintance and distress, with acquaintance signifying a voice that is personally significant, important or having omniscient knowledge of the voice hearer. Although an area of less frequent study than the above voice appraisals, there seems to be a trend toward increased voice acquaintance and increased distress. There were mixed results relating voice supremacy to acquaintance, with the largest study (Birchwood et al., 2004) reporting a relationship between voice power and acquaintance, suggesting they may be related concepts. It would seem that voice acquaintance is an area that requires further study. Two studies (Shawyer et al., 2007; Morrison & Baker, 2000) investigated voice acceptance and distress, suggesting that disapproval of the voice was linked with increased worry and sadness, whilst acceptance of the voice was linked with lower levels of depression. This area also requires further exploration as it is difficult to draw firm conclusions from just two studies. The authors also report on CBT intervention studies (e.g. Valmaggia et al., 2005), and interestingly, despite targeting voice appraisals, there are inconsistent findings of a reduction in voice appraisals leading to a reduction in distress or negative affect. They suggest that other factors, such as social schemata, that may mediate the relationship between appraisal and distress, may need to be targeted in therapies which attempt to reduce voice related distress.

Mawson, Cohen & Berry report on a number of methodological limitations of the studies reviewed, including low statistical power, high drop out in intervention

studies, new or unvalidated measures, and a failure to control for the influence of negative psychotic symptoms on depression. A further question is posed relating to whether negative voice content and beliefs about voice malevolence are independent constructs, suggesting that this is an area of future research. The authors also suggest that future research should focus on attempting to understand mediating factors in the voice hearing experience, for example social schemata, in order to further elucidate potential therapeutic targets. Mawson et al.'s review was specifically targeted at voice hearing in those diagnosed with schizophrenia, raising an interesting question as to whether beliefs about voices function in a similar or different way in non-clinical populations of voice hearers. In addition, Mawson and colleagues do not comment on the statistical methods employed in the studies included, making it hard to assess the strength of the evidence in the review.

3.3.6 Social Schemata

Paulik (2011) conducted a systematic review of the literature on social schemas and the relationship between voice hearer and voice. A total of 13 studies were included in the review published between 2000 and 2010, consisting of two intervention studies and 11 cross-sectional studies. Paulik discusses studies by Birchwood et al. (2000) and Birchwood et al. (2004), highlighting the link between subordination to others and subordination to voices, suggesting a role for social rank in hearing voices (e.g. Gilbert et al., 2001), and that perceived social rank seems to underlie appraisals of voice power and depression. Paulik also reviews Gilbert et al. (2001), and points to their finding that the more powerful voices were perceived to be, and the more inferior the hearer felt in relation to the voice, the higher their feelings of entrapment were as well as an increased desire to escape the voice.

Paulik reviews several studies exploring hearing voices and social relating (e.g. Vaughan & Fowler, 2004; Hayward et al., 2008; Sorrell, Hayward & Meddings,

2010), which investigate a theory of voice hearing based on the interpersonal relationship a voice hearer has with their voice. This research paradigm is based on Birtchnell's (2002) relating theory, and suggests that voice hearers may relate to voices along the interpersonal dimensions of power (upper/lower) and proximity (close/distant). Despite early difficulties with the validity of measures used to assess this construct in voice hearing (Vaughan & Fowler, 2004), more recent studies using more robust measures (VAY, see above) have reported that voice hearers tend to relate to their voices from a position of distance, and that voices are perceived as powerful, both of which are uniquely predictive of distress. Sorrell et al. (2010) conducted a study of both clinical and non-clinical voice hearers, and found that non-clinical voice hearers perceived their voices in a less intrusive and dominant way and related to them from a position of less distance, with less distress associated with the experience. Whilst the sample size precluded a more robust regression analysis, they were able to use partial correlations and found that beliefs about voices as measured on the BAVQ-R (Chadwick et al., 2000) perhaps moderate or mediate the relationship between voice distance and distress. Interestingly, Chin et al. (2010) conducted a qualitative study of 10 voice hearers which was interpreted as providing support for an approach to hearing voices linked to Birtchnell's Relating Theory. Paulik also comments on two intervention studies that have investigated the effects of working with social variables in voice hearing. Trower et al. (2004) conducted an RCT in command hallucinations responders, aiming to address voice related distress and voice compliance, through challenging voice related beliefs. The intervention was successful in reducing both distress and compliance with commands. Hayward et al. (2009) have developed Relating Therapy for voice hearers, and report a case series with five voice hearers. Although no statistical analyses were conducted, four of the five voice hearers reported significant benefits from the therapy.

Paulik comments on the small sample sizes in the studies reviewed (only four with greater than 40 people), cross-sectional designs limiting inferences of causality, as well as the use of newly developed measures, suggesting the need for caution in interpreting the results. However, it is suggested that an extension of the original cognitive model of voices developed by Chadwick and Birchwood (Chadwick & Birchwood, 1994; Birchwood & Chadwick, 1997) would be usefully complimented by the inclusion of social schemata as a factor that may influence voice characteristics and content, beliefs about voices, and affective and behavioural responses to voices. Paulik acknowledges that all the links between social schemata and other factors involved in the voice hearing experience need further exploration. An interesting question arises here regarding the development of social schemata, assumed to develop though early interpersonal experiences, raising the possibility that attachment style may be an important underlying feature of social schemata and hence an important aspect of the voice hearing experience.

3.3.7 The Role of Childhood Sexual Abuse

McCarthy-Jones (2011) conducted a systematic review of seven quantitative studies examining the link between childhood sexual abuse (CSA) and hearing voices. Jones points to theoretical models of hearing voices that may link with an experience of CSA. For example, memory based accounts of hearing voices (Waters et al., 2006), may fit well with evidence that traumatic events are processed in such a way that they are stored without the usual contextual information (Brewin, 2001), perhaps implicating experiences of CSA as risk factors for hearing voices. Further McCarthy-Jones suggests that source-monitoring may also be linked to CSA. He suggests that there is some evidence (e.g. Johnson et al., 1993) that internal events likely externally attributed are those requiring low cognitive effort, and that intrusive memories linked to CSA are often automatic and therefore associated with low cognitive effort, raising the question of whether such

experiences may underlie the voice hearing experience. McCarthy Jones also suggests that recent studies tracking the neurobiological changes in abused children point to changes in areas in the brain that are implicated in self-recognition (e.g. anterior cingulate cortex, STG), perhaps suggesting a role for CSA in the genesis of hearing voices.

McCarthy-Jones produces weighted mean rates of 36% of CSA in psychiatric patients who heard voices, and 56% of psychiatric patients who reported CSA reported hearing voices suggesting a substantial relationship. Further, two studies report on the prevalence of CSA in non-clinical voice hearers, with a lower weighted mean of 22% reported. From a subset of studies, rates of hearing voices were estimated at two to three times more common in those who had experienced CSA than in those who had not, and voices commenting or commanding were up to six times more common in those who had experienced CSA. McCarthy-Jones points to the methodological problems inherent in these prevalence studies, including the varying methods used to assess for presence of CSA, and concludes that it is likely that rates of CSA were underestimated.

Is CSA causal to hearing voices? McCarthy-Jones points to the methodological problems of the between-groups comparisons, which may differ in many ways: for example, failure to control for other related variables such as emotional abuse, physical abuse and bullying. In one study that did control for these variables (Shevlin et al., 2007), CSA was still associated with hearing voices and explained significant unique variance, perhaps suggesting the cumulative effects of different kinds of trauma.

McCarthy-Jones concludes that existing neural models of hearing voices need to be adapted to take into account the age-specific effects of trauma on the brain, rather than assume a uniform effect across childhood. Further, he suggests that the link between CSA and voice content may mean that existing memory models of hearing voices that see voices as aberrant intrusions, need revising,

perhaps toward a model which sees voices as “creative constructions” through an interaction of memory and normal inner speech processes.

3.3.8 Interpersonal Theories

Hayward, Berry & Ashton (2011) conducted a systematic review of the literature on interpersonal aspects of hearing voices, and their application to therapy. The authors report a seminal study by Benjamin (1989) which suggests that voice hearers have integrated, personally coherent relationships with their voices. Further, there was evidence of complimentarity in some voice relationships, with for example, a positive nurturing voice being related to from a position of trust. Benjamin also suggested that the interpersonal dynamic captured in the voice relationship was mirrored in family relationships. The authors also report on a study by Thomas, McCleud & Brewin (2009), which found evidence of complimentarity of reciprocal hostility between hearer and voice, with voice hostility uniquely predicting distress. Voice control and submission to the voice did not reach significance. However the influence of hearer submission appeared stronger when voice duration was considered.

A number of the theoretical papers reviewed by Hayward, Berry & Ashton were considered above in the section on social schemata (e.g. social rank, Birtchnell’s Relating Theory), so will not be further considered here. However, they do review a number of qualitative studies that have provided support for an interpersonal or relational approach to voice hearing. Qualitative studies, (e.g. Chin et al., 2009) pointed to the power of the voice and hearer, whilst at the same time pointing to both an acceptance and rejection of the concept of a relationship with the voice. Further, the role of stigma was highlighted as important by Ashton et al. (2011), who suggest that when a voice hearer feels they are stigmatised as “ill” in response to their voices, they are more likely to find the experience distressing, which in turn affects their ability to relate to their voices. Relating to voices from a position of distance is also backed up by qualitative research, and it is suggested

that clinical approaches to therapy with voice hearers that aim to foster development of a more engaged and controlled relationship with voices may be helpful in reducing distress.

Broadly the themes that emerged from the review by Hayward, Berry & Ashton highlight the centrality of voice power in the relationship, but also hearer power and attempts made by voice hearers to regain power in the relationship. Second, the extension of patterns of relating with voices seems to be extendable to broader patterns of social relating. Third, it is suggested that voices can serve an adaptive function. Hayward, Berry & Ashton suggest that a fruitful line of further enquiry may be the link between attachment (Bowlby, 1980) and relational styles, pointing out that none of the studies in their review consider the relational histories of voice hearers, but rather a static picture of current relational styles. Whilst this review takes a symptom oriented approach (as do many of the papers reviewed in it), most of the samples in the papers are from clinical populations, suggesting a need for future research on relational aspects of voice hearing in non-clinical samples.

3.4 Command Hallucinations

Two reviews considered the evidence on acting on command hallucinations. Bjorkly (2002) reviewed 13 papers examining the link between command hallucinations and compliance, as well as six papers additionally including the interaction with delusional beliefs. Whilst pointing to the differing sample characteristics, research designs and methodologies of the studies reviewed, Bjorkly reports that there is no robust evidence that command hallucinations lead to dangerous behaviour per se, but that there is evidence to suggest that voices ordering acts of violence toward others may increase compliance with commands, and therefore violence. Bjorkly reports that evidence for an interaction between

command hallucinations and delusions on compliance is inconclusive, given the small number of studies conducted in the area.

Subsequently Braham, Trower & Birchwood (2004) comprehensively reviewed the literature on command hallucinations and compliance, factors that mediate this relationship, and evidence of a link between command hallucinations and dangerous behaviour. Eight studies support a link between command hallucinations and compliance, with compliance rates varying widely between 15% and 88.5% due to the methods used. Seven studies investigate variables mediating compliance that all suggest beliefs about voices (malevolence and benevolence, power, voice recognition and voice content) are important. The authors suggest that despite the plausible influence of delusions there is no conclusive evidence of its impact. Thirteen studies explicitly examine the link between command hallucinations and criminal or anti-social behaviour. Evidence for such a link is variable, and probably dependent on methodology, with the strongest evidence suggesting a complex interaction between a command and beliefs about voices, and any resulting compliance, be it dangerous or otherwise.

3.5 Coping/Interventions for Hearing Voices

Farhall, Greenwood & Jackson (2007) systematically reviewed 14 studies of self-initiated coping strategies and therapeutic interventions for hearing voices in schizophrenia. Most evidence suggested that almost all voice hearers develop their own coping strategies, and that most will have tried more than one strategy. Only three studies quantified these strategies. For example, Carter et al. (1996) suggested that coping strategies were based around action (competing auditory stimulation, vocalisation, distraction). Farhall & Gehrke (1997) identified three factors that may reflect coping style (active acceptance, passive coping, and resistance coping). Of note, the authors report that the coping strategies reported did not appear to be specific to the phenomena of hearing voices, but rather to

coping with the symptoms of psychosis more generally. It would seem however that more active attempts at coping with voices and direct attempts to control voices are linked with increased levels of distress, whereas more passive coping and acceptance are linked with both reduced distress and increased perceived control. Although reporting mixed evidence about the number of strategies and effectiveness, the authors suggest that it is likely that a broader repertoire of coping strategies, and flexibility in applying them, may be beneficial. The authors also point to experimental research supporting behavioural strategies, and auditory competition, with more mixed evidence for blocking subvocalisation.

Farhall et al. (2007) also comment on interventions that specifically teach coping strategies for hearing voices, and it would seem that there is no conclusive evidence that teaching coping strategies alone is a helpful intervention. Further, the authors suggest that as coping has rarely been the primary focus of published CBT treatments, it is difficult to draw conclusions, particularly as where it has been included there are often no specific reports on its impact on hearing voices. Where coping has been incorporated into broader treatments for hearing voices and psychosis, including CBT, it is not clear what specific effects these components have had on outcome. The authors point to the emergence of mindfulness based interventions for hearing voices, as a way of developing a more acceptance based coping repertoire (see below). In sum, the authors suggest that future research on coping should move away from descriptive lists of coping strategies and examine the complex nature of the interaction between the voice hearing experience, beliefs about voices, and coping.

Aleman & Laroi (2011) conducted a systematic review of novel treatments for voices in schizophrenia. They review the evidence for Transcranial Magnetic Stimluation (rTMS) in the treatment of hearing voices, stating that the aim of rTMS is to reduce baseline excitability in speech perception areas (see above areas implicated in neuroimaging studies). Currently the evidence for rTMS is mixed, and

requires further research. Aleman & Laroi comment on the literature on CBT for psychosis, and cite a recent meta-analysis by Zimmerman et al. (2005) which showed a small to moderate effect size for treatment effects on positive symptoms. However, Aleman & Laroi point out that the majority of intervention studies have not explicitly tested the efficacy of particular interventions on hallucinations per se, but rather on positive symptoms as a whole, making it difficult to draw firm conclusions about what particular therapeutic interventions will be helpful for voice hearers.

Aleman & Laroi point to the emergence of Acceptance and Commitment Therapy (ACT) as a treatment intervention and state that there have been promising results in recent randomised-controlled trials (e.g. Bach & Hayes, 2002), which would seem to fit with evidence presented above by Farhall et al. (2007) that acceptance coping reduces voice related distress. A further emerging treatment, which is suggested to be embedded within a larger meta-cognitive therapy framework, is the attentional training technique (ATT). ATT aims to help voice hearers take control over their attention, aiming to then divide their attention between their voices and different sounds. Aleman & Laroi suggest that this may be helpful as it targets processes underlying excessive attentional self-focus, which has been implicated in hearing voices (see Kompus et al., 2011, above). Initial case studies of this approach have been promising, although it requires further research with controlled trials. Aleman & Laroi also suggest that competitive memory training (COMET), although only recently applied to hearing voices, showed some promising early results. COMET assumes that psychopathology in general involves activation of dysfunctional meanings in the wrong context, and aims to influence the retrieval competition so that the chances of retrieving a more functional meaning are increased. Aleman & Laroi also point to appraisal driven cognitive therapy (e.g. Chadwick & Birchwood, 1994), which has shown positive results in reducing distress and increasing coping.

Ruddle, Mason & Wykes (2011) conduced a systematic review of the literature (16 empirical studies) on hearing voices groups, including evidence and mechanisms for change. The authors suggest that there is little current evidence to support unstructured open-ended support groups, despite some positive results in uncontrolled small scale reports. Problem –solving and skills based groups likewise have produced some promising early results, although it would seem that some gains were not present at follow-up (e.g. voice tone, depression and distress), suggesting that any potential gains may have come from the group experience itself. In both uncontrolled and non-randomised evaluation studies, as well as those that utilise an RCT design, there is mixed evidence for CBT groups. For example, in a non-randomized study targeting distressing beliefs about voices, Chadwick et al. (2000) found a reduction in beliefs about voices power and control, but not related distress. It is quite striking that of the CBT group studies reported, whilst some report more general improvements in social functioning or general psychopathology, where distress was reported as an outcome variable, results were often non-significant. Ruddle et al. suggest quantitative data on mechanisms of change implicate beliefs about voices, and in considering the potential for belief change without positive effects on distress, suggest that other factors, such as coping, self-esteem and social activities may also mediate the relationship. In sum, the authors conclude that whilst acceptable to service users and facilitators, given the mixed results found in their review, hearing voices groups need more focused research on mechanisms of change and efficacy, particularly to justify time and resources in the current health care environment.

4. Discussion

4.1 Summary

This review aimed to appraise the different levels of evidence for hearing voices and to assess the strength of the evidence for a relational view on hearing voices. Evidence from structural imaging studies (Allen at al., 2008; Pallaniyapan et al., 2012) have found evidence for the role of speech perception areas (STG) and speech production areas, and both reviews lend support to an inner-speech account of hearing voices. Functional imaging studies have implicated a diverse network of brain areas in hearing voices, also largely in support of an inner speech account of hearing voices. The most striking finding across studies is the implication of speech perception areas, particularly the STG (Woodruff, 2004; Jardri et al., 2011, Kompus et al., 2011; Kuhn & Gallinat, 2010; Stephane et al., 2001; Wible et al., 2008), strongly supporting an inner speech model explanation of hearing voices (Allen et al., 2007). There is also evidence in support of memory retrieval in hearing voices, implicating the hippocampus (Jardri et al., 2011) and the amygdala (Woodruff, 2004). It should be noted that almost all of the neurobiological evidence pertains to schizophrenia alone.

Psychological explanations of hearing voices have contributed to the literature significantly, particularly by highlighting potential psychological factors associated with the experience in both diagnosed and non-diagnosed individuals. Seal et al. (2004) and Dittman & Kuperberg (2005) have provided evidence to suggest that inner speech and source monitoring are central to the experience of hearing voices, and a meta-analysis by Waters et al. (2010), has highlighted the centrality of a self-recognition deficit in those diagnosed with schizophrenia who hear voices, a mechanism assumed to be central to both an inner-speech and a source monitoring account of hearing voices. Badcock & Hugdahl (2012) have provided evidence for some shared cognitive mechanisms between psychotic and non-psychotic voice hearers, including increased intrusive thoughts and poor inhibition control. However, psychotic voice hearers had poorer source memory and differences in lateralisation of brain function, suggesting both support and contradictory evidence of a

continuum model of hearing voices. Mawson et al. (2010) provide evidence for a strong link between beliefs about voices and voice related distress, whilst Paulik (2011) suggests that social schemata may be a key psychological variable that may underlie this relationship. McCarthy-Jones (2011) links CSA with the experience of hearing voices, suggesting a model of hearing voices that incorporates both memory reconstruction and inner speech. He also highlights the impact of CSA on the STG, perhaps implicating a role for early social experience impacting on brain regions associated with hearing voices. Hayward et al. (2011) highlight the importance of the relationship a voice hearer has with their voice, providing evidence that patterns in social relationships in general are similar to those found in the relationship a hearer has with their voice. Bjorksy (2002) and Braham et al. (2004) both review evidence on the link between command hallucinations and dangerous behaviour. It would seem that there is a link between command hallucinations and compliance, which is mediated by beliefs about voices. However, there is no conclusive evidence linking command hallucinations to dangerous behaviour per se.

Farhall et al. (2007) reviewed self-initiated coping strategies for hearing voices, as well as coping strategies in psychological treatments. They provide evidence that acceptance driven coping seems more effective and highlight the difficulties in assessing coping within the existing treatment literature on hearing voices. Aleman & Laroi point to recent novel therapeutic interventions more specifically targeted at hearing voices, and although in their infancy, there have been some promising results. Ruddle et al. (2011) review hearing voices groups and suggest that there is mixed evidence for their efficacy and further research is needed both in terms of efficacy and in terms of mechanisms of change.

4.2 Integration

It is certain that the experience of hearing voices is complex, as suggested by the different levels of explanation presented in this review. However, it would seem that it is possible to integrate the different levels of explanation somewhat, by considering hearing voices as a social and relational process. The brain areas implicated in the structural and functional imaging literature, are, as Wible et al. (2008) point out, part of and overlapping with areas of the brain that are involved in social perception and communication. Whereas Wible et al. see a dysfunction in the these areas of the brain as leading to more general social deficits in schizophrenia (as well as being central to and causal in hearing voices), there is evidence that social experiences in the form of CSA can impact on brain functioning in these same areas e.g. the STG (McCarthy-Jones, 2010). One may hypothesise therefore that the patterns of brain activity observed during the experience of hearing voices may have their roots in past social experiences, suggesting that the experience of hearing voices is not merely an epiphenomenon of brain activity in speech production and perception areas, but one that is based in an individual's previous complex interpersonal history and suffused with meaning for the individual.

The psychological literature reviewed in this paper has suggested a variety of factors, including CSA, social schemata, beliefs about voices and the relational dynamics within the voice and hearer relationship as important in the experience of hearing voices. There are a number of well validated measures that are able to assess the above factors. One might argue that a significant weakness of the neuropsychiatric literature, including both structural and functional imaging studies, is the failure to consider or control for the effects of these variables, perhaps explaining the diverse cortical and subcortical brain structures implicated. Further, although several meta-analyses reviewed above provide stronger levels of evidence, the general trend within the neuropsychiatric literature is one of small sample sizes and hence compromised external validity.

From both imaging and psychological studies, there would appear to be a strong case for a deficit in self-recognition (Waters et al., 2010) and inner speech. Whilst Seal et al. (2004) propose a cognitive model for hearing voices described above, based upon a feed-forward signal dysfunction, and which includes a range of more psychological factors, this model does not take into account relational aspects to the voice hearing experience. In addition, recent imaging evidence has not supported a "corollary discharge" hypothesis implicated in this model (Ford & Mathalon, 2005). Further, this kind of feed forward monitoring system has been criticised by Fernyhough (2004). He argues that presumably a monitoring system would need to be monitored by another system, and that by another etc. Fernyhough (2004) and Jones & Fernyhough (2007) propose a model of voice hearing and inner speech based on a Vygotskian approach. This model suggests that inner speech is developed first through experiencing a social discourse with another, before a child then moves on to private speech, or thinking aloud. As development progresses, private speech becomes internalised in the form of expanded inner speech, which is dialogic in nature, before becoming condensed inner-speech, what Vygotsky described as thinking in pure meaning. It is hypothesised that under conditions of stress, a re-expansion of inner-speech may occur, such that condensed inner-speech may become expanded inner-speech, and in the absence of any external auditory stimulation may be experienced as hearing voices. Jones & Fernyhough (2007) provide support from neuroimaging studies to support this model. The model highlights the relational nature of acquiring inner speech and thought, and Fernyhough (2004) points to the potential role of the attachment relationship in early experience of discourse. It is suggested that children with insecure attachments may have fewer opportunities for internalising dialogue, leading to a possible disturbance in inner-speech development.

Recent models of hearing voices based on intrusive memories (e.g. Waters et al., 2006), whilst accounting for a certain subset of voices, may be criticised on

account that they do not capture the diverse phenomenology of reported experience of voices (Jones, 2010). A recent cognitive model proposed Waters et al. (2012) can be seen as an attempt to integrate both inner-speech and memory based accounts, seeing both bottom-up neurological processes and top-down cognitive factors, including “past experience” as important. Whilst a thorough discussion of this model is beyond the scope of this review, a significant strength is the integration of both neurological and cognitive factors, with a potential for more relational aspects of the voice experience perhaps having roots in past experience. A further strength of this model is the inclusion of the impact of delusional beliefs on the experience of hearing voices.

Of interest clinically is evidence of mixed impact on distress related to voices, when beliefs associated with voices are targeted in therapy (Farhall et al., 2007; Ruddle et al., 2011). Given Paulik’s (2011) assertion that social schemata may underlie the voice hearing experience, along with Birchwood et al.’s (2004) suggestion that social role schema underlie beliefs, perhaps a therapy which targets these underlying schemata in relation to voice hearing may be helpful in reducing distress. In addition, the role of the relationship between hearer and voice seems to be important, and Hayward (2009) provides some preliminary evidence that Relating Therapy for voices may be a helpful approach in changing the dynamics between hearer and voice. Also of interest clinically are the processes involved in generation of social schemata as related to hearing voices. Attachment is one framework which may help to elucidate this. Berry (2011) investigated the link between attachment and the nature of the relationship with voices, and reported an association between attachment anxiety and distress and severity of voices, and attachment avoidance and themes of criticism and rejection in hearing voices.

4.3 Future Research

Future neuroimaging research may benefit from increased sample sizes, and also an attempt to focus some attention on non-clinical voice hearers, as this group appear to be under-represented in the literature. Further, neuroimaging studies should attempt to control for key psychological variables associated with voice hearing, with the aim of understanding the neural basis of such related variables as beliefs about voices or interpersonal schemata. In addition, as Jones (2010) suggests, some attempt should be made to capture the diverse phenomenology of voices, rather than describing participants as “hallucinators” or “non-hallucinators” or “non-clinical hallucinators”, in the hope that acknowledging the diverse phenomenology of voices may lead to further understanding of the underlying neural processes.

Psychological research thus far has focused on a number of factors that are associated with the voice hearing experience, and has benefited on the whole from larger sample sizes. However, some questions remain as to the overlap of concepts such as social rank, social schemata, and relational dynamics, and future cross-sectional research may be able to unpick this through large scale studies measuring multiple variables and applying regression analyses. Of particular interest may be the link between attachment and key psychological variables associated with voices (e.g. beliefs about voices, social schemata, relational dynamics) and distress.

Aleman & Laroi (2011) point to the lack of specific interventions for hearing voices in many therapy trials, but rather a more specific focus on positive symptoms in psychosis (Wykes, 2004). Perhaps the treatment literature would benefit from an increased focus on interventions specifically targeting voices, as well as targeting key psychological processes which may underlie the voice –distress relationship. It would seem this should be a priority, if current psychological treatments for psychosis are to proceed further than generic therapy models developed for a heterogeneous population (Steel, 2008).

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Part 2: Empirical Paper

Attachment and Interpersonal Processes in Hearing Voices

Abstract

Aims: This study investigated the link between attachment anxiety/avoidance, interpersonal aspects of the voice relationship, and distress whilst considering the impact of beliefs about voices and paranoia.

Method: A cross sectional correlational method was employed and participants were recruited mainly via online forums for people who hear voices. 44 participants who heard voices completed a number of self-report measures tapping attachment, interpersonal processes in the voice relationship, beliefs about voices, paranoia, distress and depression.

Results: As predicted, associations were found between attachment avoidance and voice intrusiveness, hearer distance and distress. Associations were also found between attachment anxiety and voice intrusiveness, hearer dependence and distress. A series of simple mediation analyses were conducted which suggest that the relationship between attachment and voice related distress may be mediated by interpersonal dynamics in the voice – hearer relationship, beliefs about voices and paranoia.

Conclusions: Results are considered within existing theory whilst acknowledging the limitations of the study. Clinical implications are considered and it is concluded that this preliminary investigation would suggest that attachment is important to consider in therapy with people who hear voices.

1. Introduction

Auditory verbal hallucinations or hearing voices are a common and often distressing experience and often associated with psychosis. It has been estimated that up to 70% of people diagnosed with schizophrenia will hear voices at some point (Landmark et al., 1990) and the experience of hearing voices in those diagnosed with schizophrenia is often felt to be intrusive, unwanted and uncontrollable (Nayani & David, 1996). In more recent years evidence has emerged that psychotic symptoms exist on a continuum in the general population (Johns & van Os, 2001; Stip & Letourneau, 2009). In particular, a recent systematic analysis of the prevalence of hearing voices in the general population by Beaven et al. (2011) would suggest that about 10% of the general population hear voices at some point in their lives.

In recent years there has been increasing interest in examining the relationship that people who hear voices have with their voices, how this may be linked with distress and also inform clinical intervention. Birchwood and Chadwick (1997) state that distress linked with hearing voices can be understood in relation to the beliefs a person has about the voice, rather than voice content, topography, or the characteristics of a person's psychotic illness alone. Birchwood and Chadwick suggest that beliefs about voices, specifically, omnipotence, malevolence and benevolence, are driven by core interpersonal schemata, developed through each person's unique interpersonal experiences. Birchwood *et al*. (2000), report that voice hearers were lower in social rank and subordinate to their voices, and that this relationship was mirrored in other social relationships.

Consistent with this, there is some evidence that people who experience themselves as lower in rank to both people in their wider social context and to their voices are more likely to experience depression (Stefanis *et al.* 2002). Birchwood *et al*. (2004) found support for a model of distress in voice hearing which sees

interpersonal schema (about subordination to others and linked to social rank and social power) as underpinning both depression and distress due to voices, and subordination to voices (or delusions about voices). Further, Birchwood *et al*. suggest that it is powerlessness and inferiority in relationships in general that is linked with the perceived power of the voice. Birchwood (2003) has suggested that childhood abuse and neglect or problems in parental attachment may influence the development of cognitive schemas, which in turn impact on the above factors in the voice – hearer relationship. Paulik (2011) in a systematic review of the literature, suggested that the existing cognitive model of voice hearing developed by Chadwick & Birchwood (1994) and Birchwood & Chadwick (1997) should be expanded to include interpersonal schemata as underpinning voice characteristics and content, beliefs about voices, and affective and behavioural responses to voices.

An alternative and complimentary way of conceptualising the voice hearing experience is within Birtchnell's Relating Theory (1996, 2002). Essentially interpersonal, Relating Theory describes how people relate on two dimensions: power and proximity. Power involves the amount of influence that one has over another, while proximity describes the distance that is between two people, and hence the degree of intimacy.

In an attempt to widen the focus of research on hearing voices, and to capture the complexity of the voice hearing experience, Vaughan and Fowler (2004) considered the influence of interpersonal dimensions on voice hearing. In a clinical sample of voice hearers, Vaughan and Fowler adapted Birtchnell's (1994) questionnaire designed to examine dimensions of power and proximity in couple relationships, to focus on interpersonal processes between voice hearers and voices. They found that voice upperness (the tendency of the voice to relate in a dominating and insulting way) and hearer distance (the tendency of an individual to react with suspicion and lack of communication with the voice) were associated with

increased levels of distress, and were independent of beliefs about voices. However, there were a number of methodological problems with this study, including poor psychometric properties on several subscales of the developed measure, and too small a sample.

Hayward (2003) provided support for the idea that interpersonal relationships with voices are reflective of interpersonal relationships in general, on the dimensions of voice intrusiveness, dominance and hearer dependence. Sorrell *et al.* (2010) aimed to replicate the results of Vaughan and Fowler using a more robust measure of interpersonal voice hearing, the Voice and You questionnaire, (Hayward, 2008). In a sample of clinical and non-clinical voice hearers, Sorrell *et al.* report that significant correlations were observed between distress and voice dominance, voice intrusiveness, and hearer distance. In contrast to predicted hypotheses, the associations were not independent of voice omnipotence and malevolence, leading to a suggestion that such beliefs possibly moderate or mediate distress in voice hearers (although this was not tested statistically due to the sample size of the study). There has been some qualitative support for Relating Theory in the context of voice hearing through an interpretative phenomenological analysis (IPA) study. Chin *et al.* (2009) found that where the concept of a relationship with a voice was accepted, the concepts of power and proximity were observable within participants' responses. However, the concept of a relationship with a voice was simultaneously accepted and rejected by a number of voice hearers.

There has been increasing interest in recent years in the link between attachment and a range of aspects of psychosis. Attachment theory suggests that human beings have an innate desire to form close relationships with significant caregivers and that these relationships can function as a way to modulate distress in childhood, as well as adulthood (Bowlby, 1980). It is suggested that early attachment relationships can impact on interpersonal functioning via the

development of internal working models of the self and of others, which play a part in emotional regulation and drive patterns of relating. The majority of attachment research in psychosis has been conducted using the Adult Attachment Interview (AAI; Main & Goldwyn, 1984). Dozier (1990) and Dozier *et al.* (1991) reported higher levels of insecure attachment in people with a diagnosis of schizophrenia.

The AAI can be time consuming, expensive, and in samples with psychosis, the clarity of the narrative needed to inform the interview can be muddied by psychotic symptoms (Berry *et al.,*2006). An alternative to the AAI is to measure adult attachment using self-report measures. A number of self-report measures have been developed to measure attachment in romantic and other relationships. Factor analyses of such measures have suggested two underlying constructs that can be conceptualised in affective terms as attachment anxiety and attachment avoidance, or in cognitive terms as a model of self versus a model of others.

Bartholomew (1990) has developed a model of attachment based upon these dimensions, with four categories of attachment: Secure, characterised by a positive view of self and others; Preoccupied, characterised by a positive view of others and a negative self view, and therefore a sense of self-worth that is dependent on gaining the approval of others; Dismissing, characterised by an overt positive self view, but denial of feelings of distress and dismissal of the importance of close relationships, and Fearful, characterised by a negative self view and a negative view of others, with discomfort in close relationships and high levels of distress. More recently, Berry *et al.* (2006) have developed the Psychosis Attachment Measure (PAM), a self-report questionnaire based on Bartholomew's model of attachment and adapted for use in samples of people with psychosis. The PAM measures attachment anxiety and avoidance, and has been validated in samples of people with psychosis (Berry, Barrowclough & Wearden, 2008).

Recent research has highlighted the importance of attachment anxiety and avoidance in clinical populations with psychosis. Berry, Barrowclough & Wearden

(2008) report that avoidant attachment is associated with positive symptoms, negative symptoms and paranoia, and that higher levels of attachment anxiety and avoidance are associated with interpersonal difficulties, whilst high levels of attachment avoidance are associated with poor engagement in therapeutic relationships. Berry, Barrowclough & Wearden (2007a) reported that, in individuals diagnosed with psychosis, associations between attachment anxiety and avoidance measured in close relationships in general were associated with close relationships with specific individuals, including key workers and parents. Tait, Birchwood & Trower (2004) report that avoidance coping or "sealing over" in people with psychosis is associated with insecure attachment, and that insecure attachment is associated with poorer engagement with services. In a student sample, Berry *et al.* (2006), report an association between attachment anxiety and hallucinations. However, Pickering, Simpson & Bentall (2008) report that in a student sample, insecure attachment predicted paranoia, but not hallucinations, once co-morbidity between paranoia and hallucinations was controlled for. In a study of voice hearing and attachment, Berry (2011) reports significant associations between attachment anxiety, voice severity, and amount and intensity of voice distress. In contrast to previous research, no association was found between attachment avoidance and the above voice dimensions. Further, Berry reports associations between attachment avoidance and themes of criticism/rejection in voices and themes of threat.

As it has been suggested that the relationship with a voice can be similar to relational patterns in general, this study aims to explore the link between attachment and the relationship people have with their voices. Specifically, it aims to examine the link between attachment, the interpersonal processes in voice hearing, beliefs about voices, paranoia, and distress from hearing voices. The present study has a number of hypotheses:

1) Attachment avoidance will be associated with hearer distance, voice dominance and increased distress.

2) Attachment anxiety will be associated with voice intrusiveness, hearer dependence and increased distress.

3) The relationship between attachment anxiety/avoidance and distress will be mediated by voice related variables and paranoia.

2. Method

2.1 Design

A correlational study was employed with a cross-sectional design. Participants completed a series of self-report measures.

2.2 Participants

Participants were adults aged 18 and above who heard voices. There were no diagnostic criteria imposed on the study. Consequently the only requirement of participants was that they heard voices, regardless of presence or absence of a diagnostic label. A total of 44 people took part in the study.

As this study was conducted on-line (see procedure below), the majority of participants were recruited via on-line advertising (see Appendix 1 for copy of advert). In the first instance the London Hearing Voices Network was approached to discuss the possibility of contacting voice hearers through their network. Consequently contact was made with a number of hearing voices group facilitators and details of the study passed to them in the hope that group members may be interested in taking part. Uptake was quite low using this approach so efforts were concentrated on online recruitment. Contact was made with Intervoice (an international community for voice hearers) and the study was advertised in the research section of their website. The study was also advertised on the Intervoice

facebook and twitter pages. Further, the study was advertised on the Intervoice forum (which appears on the Mental Health Forum website).

2.3 Procedure

Potential participants were able to click on a link via the advert in the different on-line forums which took them to the study homepage (see Appendix 2). Before deciding to participate, participants were asked to read the information and consent forms (see Appendix 3 and 4) and to indicate that they had understood them. As this was an online study it was not possible to debrief participants afterwards. However, participants were given the option of leaving contact details on the study page so that they could be sent a copy of the research report if they wanted.

Once participants had decided to take part they were directed to a page collecting some demographic information. Participants were asked to provide information on their age, gender, ethnicity, duration of hearing voices, contact with mental health services, whether they took medication for voices, if they had a diagnosis and what the diagnosis was (see Appendix 5). Answers to these questions were optional and all were in the form of a free text space for participants to answer, rather than multiple choice questions. Following demographic questions participants completed the self-report questionnaires.

2.3 Ethics

Ethical approval for the study was sought and obtained through the University College London Ethics Committee (see Appendix 6 for copy of approval letter). As the study was relatively non-intrusive and relied on self-report questionnaires it was hoped that potential distress for participants would be kept to a minimum. Given that there was no contact with participants directly it was suggested that participants should contact their GP or the Samaritans should they feel distressed after completing the study. Participants were made aware that their information would be

handled in accordance with the Data Protection Act. Participants were informed that they could choose to withdraw their responses at any time, but would need to leave contact information on the study page so that their responses could be identified by the researcher.

2.4 Measures

Psychosis Attachment Measure (PAM; Berry *et al.,* 2006). The Psychosis Attachment Measure is a 16 item self report questionnaire. Each of the 16 items contributes to either the anxiety or the avoidance subscales. The anxiety and avoidance subscales have acceptable internal reliability (anxiety=0.82, avoidance=0.76) and concurrent validity with existing self-report measures of attachment (The Relationships Questionnaire; Bartholomew & Horowitz, 1991). (Please see Appendix 7 for PAM)

Voice and You (VAY; Hayward *et al.*, 2008). The Voice and You questionnaire is a self report questionnaire with 28 items. It assesses interpersonal relational aspects of the relationship with the dominant voice. There are four subscales comprising of voice intrusiveness, voice dominance, hearer distance and hearer dependence. All subscales demonstrate acceptable internal reliability with alphas greater than 0.7. The VAY also has acceptable test-retest reliability with all scales correlating above 0.7 on 3 week retest. The VAY has reported concurrent validity with the BAVQ-R. (Please see Appendix 8 for VAY)

Beliefs About Voices Questionnaire – Revised (BAVQ-R; Chadwick *et al.,* 2000). The BAVQ-R is a 35 item self report questionnaire of a person's beliefs, emotions and behaviour in response to voices. It has five sub-scales, three of which focus on a person's beliefs about the dominant voice (omnipotence, malevolence and benevolence) as well as two scales which look at emotional and behavioural

responses (resistance and engagement). Subscale alphas are all above 0.7 indicating good internal reliability, with correlations between malevolence and resistance, and benevolence and engagement suggesting construct validity. (Please see Appendix 9 for BAVQ-R)

Persecution and Deservedness Scale (PADS; Melo *et al.,* 2009). The PADS is a 10 item self report questionnaire giving scores for both persecution and deservedness of the persecution. Deservedness of persecution can only be calculated once a certain level of persecution is recorded. The alpha level for the whole measure is reported to be 0.84, indicating acceptable internal reliability. It is reported to have good concurrent validity. (Please see Appendix 10)

Beck Depression Inventory II (BDI-II; Beck, Steer & Brown, 1996). The BDI – II is a 21 item measure of severity of depression, is widely used in research and routine clinical practice, and has good psychometric properties.

Distress

There are no validated self-report measures of distress in relation to voice hearing. Studies typically take the distress items rating from the Psychotic Symptoms Rating Scale (PSYRATS; Haddock, McCarron, Tarrier & Faragher, 1999), or devise a measure of distress. The PSYRATS is a clinician administered measure, and was therefore not suitable for this study. Consequently distress in relation to the predominant voice was measured on a 5 point Likert scale, with 0 = no distress and 5 = extremely distressed (Please see Appendix 11)

2.5 Sample Size and Power Analysis

Prior to the study a power analysis was conducted in order to estimate the sample size. The only previous study investigating the relationship between attachment

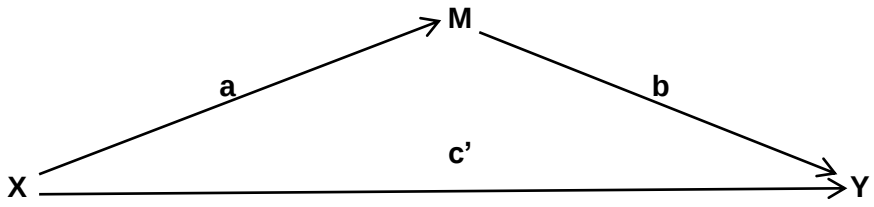
anxiety and avoidance and the relationship with voices was by Berry (2011). This study and other relevant studies in the relationship with voices literature were considered, with most effect sizes ranging from 0.3 to 0.5. Consequently an effect size of 0.35 was entered into G Power 2 and was considered a conservative estimate. Results suggested a sample of 46 would be sufficient to detect an effect (effect size = 0.35, alpha = 0.05, power = 0.8; t(44) = 1.6802, delta = 2,5341). Recruitment therefore aimed to achieve a sample size of 46, but fell short of this number by 2 (n=44), which was deemed acceptable given the conservative power analysis.

2.6 Data Analysis

Demographic information and scores from the self-report measures were entered into SPSS version 20. Distribution of variables was checked for normality by checking histograms visually and checking statistics for normality. Parametric tests were used in the analysis except where scales did not meet criteria for normality. Given the directional hypotheses outlined above one-tailed tests were used to test hypotheses one and two using correlational analyses.

A series of mediation analyses were used to test whether the relationship between attachment (anxiety and avoidance) and distress were mediated by voice related variables (beliefs about voices and interpersonal processes) and paranoia. Mediation analyses allow for testing the effect of one variables relationship on another through a third variable known as the mediator (see figure 1). The relationship between a variable X and Y in mediation (C') is called the direct effect. Complete mediation is considered to have occurred if variable X no longer affects Y once a mediating variable (M) has been controlled for. Partial mediation is considered to have occurred where the relationship between X and Y is reduced when a mediator is introduced but not to zero.

Figure 1: Relationships in Mediation



One common way of testing for mediation is that proposed by Baron & Kenny (1986) where a series of steps are completed to test for mediation. However this method has been criticised in the social science literature as it does not directly test for an indirect effect of X on Y through M, the combined effect of a and b in figure 1 (Preacher & Hayes, 2004). Rather, the indirect relationship is inferred after running several regression and multiple regression analyses and via a process of deduction. However, there are a number of ways to test for a mediating effect directly. Bootstrapping was chosen for the mediation analysis in the current study as it is preferable for use in small sample sizes, and as a non-parametric test does not make assumptions about normal distributions. Preacher & Hayes (2004) have produced a script for SPSS which tests for indirect effects in simple mediation using bootstrapping. The script was used for mediation analyses in the current study.

3. Results

3.1 Descriptive Information

A total of 44 people participated in the study. The mean age of the sample was 39.6 (SD=11.739). 34% of the sample was male (n=15) and 66% was female (n=29). Participants were asked to state their ethnicity and responses were grouped

broadly into the following categories: White (72.7%, n=32), Black (2.3%, n=1), Mixed (6.8%, n=3) and Other (18.2%, n=8). The average duration of voice hearing was 15.5 years (SD=14.3). 73% of participants (n=32) had had contact with mental health services while 27% (n=12) had not. 86% of the sample (n=38) stated that they had a diagnosed mental health difficulty, whilst 14% (n=6) said they did not. Participants were given the opportunity to state a diagnosis and responses were coded by the researcher and fell broadly into five categories: Psychosis (48%, n=21); Bipolar Affective Disorder (11%, n=5); Personality Disorder (16%, n=7); Mixed Diagnosis (9%, n=4) and None (16%, n=7). 55% (n=24) of participants reported being prescribed medication in relation to voice hearing whilst 45% (n=20) said they had not.

Table 1 provides the means and standard deviations on each measure subscale for the entire sample, and for clinical voice hearers and non-clinical voice hearers (defined separately by presence or absence of diagnosis and contact with mental health services). The table also provides tests for differences between clinical and non-clinical voice hearers. Clinical voice hearers defined by presence or absence of a diagnosis comprised 86% of the sample (n=38) and non-clinical voice hearers 14% (n=6). Defined by contact with mental health services, clinical voice hearers comprised 73% (n=32) and non-clinical voice hearers 23% (n=12). Given that these groups were different in size caution needs to be taken when interpreting tests of difference. When defined by presence of a diagnosis, the only significant difference that emerged between these two groups was an increased score on the BDI in the clinical compared to the non-clinical group ($t(42)=2.058$, $p=0.05$). When defined by contact with mental health services, significant differences emerged with increased scores on the BDI ($t(42)=3.268$, $p=0.05$) in the clinical group and also on the omnipotence scale of the BAVQ-R ($t(42)=2.552$, $p=0.05$.

Table 1: Means and standard deviations on subscales for whole sample, clinical voice hearers and non-clinical voice hearers (defined by both presence of diagnosis and contact with mental health services).

Measure/Scale	Whole Sample (Mean/SD) n=44	Clinical (Diagnosis) (Mean/SD) n=38	Non-Clinical (No Diagnosis) (Mean/SD) n=6	p=*	Clinical (MH services) (Mean/SD) n=32	Non-Clinical (No MH Services) (Mean/SD) n=10	p=*
VAY-Voice Dominance	11.8/7.5	11.8/8.6	11.8/8.6	.990	11.5/7.2	12.6/8.5	.698
VAY-Voice Intrusiveness	8.2/4.9	8.5/4.9	6.5/5.6	.374	8.3/5.0	8.0/4.6	.876
VAY-Hearer Dependence	8.9/6.6	9.6/6.7	5.2/4.6	.134	9.0/6.8	8.9/6.2	.957
VAY-Hearer Distance	10.9/6.5	11./6.6	9.5/5.7	.579	11.3/6.2	9.3/7.6	.394
PAM-Anxiety	10.9/6.5	11.3/6.7	8.7/5.3	.322[a]	11.6/6.92	9.2/5.2	.316[a]
PAM-Avoidance	15.2/5/2	15.2/5.2	15.6/5.5	.997	15.4/5.8	14.3/3.2	.582
BAVQR-Omnipotence	10.9/6.4	11.5/6.4	7.2/5.2	.128	12.2/6.5	6.7/3.4	.015**
BAVQR-Malevolence	8.8/6.1	9/6.2	7/5.9	.456	8.7/6.0	8.7/6.1	.993
BAVQR-Benevolence	5.8/5.4	5.5/5.2	7.5/6.8	.605[a]	5.4/5.0	7.4/6.8	.318[a]
BAVQR-Resistance	15.3/7.4	15.9/7.5	11/5.5	.128	16.0/7.2	12.0/7.1	.132
BAVQR-Engagement	7.1/6.6	6.6/6.3	10/7.9	.393[a]	6.8/6.4	7.9/7.6	.638[a]
PADS-Persecution	20.9/11.7	21.3/11.4	18.5/14.2	.592	22.5/12.4	15.9/8.6	.125
PADS-Deservedness	11.6/13.2	12.4/13.7	5.3/7.7	.226	13.0/14.5	6.2/5.5	.158
Distress	2.3/1.4	2.5/1.4	1.7/1.6	.259[a]	2.5/1/4	1.7/1.5	.113[a]
BDI	26.6/18.4	28.8/18.4	12.7/10.9	.044**	30.9/17.2	11.6/12/8	.002**

***=T test for difference between clinical and non-clinical voice hearers**

[a] = Mann Whitney U Test

****Significant difference**

Table 2 shows reliability analyses for the measures used in the study. All subscales were found to have Cronbach's alpha scores above 0.7 and can therefore be judged to have acceptable internal reliability.

Table 2: Reliability Analysis for Subscales

Scale	Subscale	Items (n)	Cronbach's Alpha
PAM	Anxiety	8	.873
	Avoidance	8	.814
VAY	Voice Dominance	7	.937
	Voice Intrusiveness	5	.856
	Hearer Distance	7	.837
	Hearer Dependence	9	.788
BAVQ-R	Omnipotence	6	.840
	Malevolence	6	.872
	Benevolence	6	.865
	Resistance	9	.846
	Engagement	8	.855
PADS	Persecution	10	.908
	Deservedness	10	.975

3.2 Hypothesis Testing

3.2.1 Hypothesis 1 and 2

Hypotheses one and two were tested using correlational analysis. Hypothesis one stated that attachment avoidance would be associated with increased voice dominance, hearer distance and distress. Table 3 summarises correlations between subscales of the PAM, VAY, BAVQ-R and voice related distress. As predicted, attachment avoidance was positively associated with voice dominance ($r(42)=.532$, $p=.01$), hearer distance ($r(42)=.301$, $p=.05$) and distress ($r(42)=.496$, $p=.01$). Spearman's Rho was used to calculate the attachment avoidance and distress correlation as the distress variable did not meet criteria for normality and transformation did not resolve the distribution problem.

Table 3: Correlations between the PAM, VAY, BAVQ-R and Distress

		PAM				VAY				BAVQ-R			Dist
		Anx	Avoid	Dom	Int	Dep	Dist	Omnip	Malev	Benev	Res	Eng	
PAM	Anxiety	-											
	Avoidance	.511**	-										
	Dominance	.595**	.532**	-									
VAY	Intrusiveness	.462**	.533**	.808**	-								
	Dependence	.420**	.405**	.045	.253*	-							
	Distance	.507**	.301*	.712**	.484**	-.259*	-						
	Omnipotence	.580**	.586**	.605**	.659**	.410**	.393**	-					
	Malevolence	.560**	.507**	.560**	.737**	.099	.585**	.655**	-				
BAVQ-R	Benevolence	-.182	-.196	-.436**	-.206	.469**	-.650**	-.153	-.490**	-			
	Resistance	.450**	.269*	.624**	.478**	-.118	.755**	.432**	.557**	-.638**	-		
	Engagement	-.068	-.156	-.458**	-.305**	.551**	-.597**	-.142	-.463**	.806**	-.433**	-	
Distress		.512**	.461**	.765**	.635**	.047	.726**	.711**	.717**	-.585**	.740**	-.551**	-

*= significant at p=0.05
**= significant at p=0.01

Hypothesis two stated that attachment anxiety would be positively associated with voice intrusiveness, hearer dependence, and distress. Again, as predicted, attachment anxiety was positively associated with voice intrusiveness ($r(42)=.435$, $p=.01$), hearer dependence ($r(42)=.410$, $p=.01$) and distress ($r(42)=.538$, $p=.01$). However, as can be seen from Table 3, both attachment anxiety and attachment avoidance were significantly correlated with all subscales of the VAY, and all but the benevolence and engagement subscales of the BAVQ-R, suggesting a strong lack of specificity in the observed results. A further caveat needs to be considered when interpreting the above results. First, very substantial inter-correlations were found between subscales on the VAY. Notably, voice dominance and voice intrusiveness were highly correlated ($r=.808$, $p<.01$) as were voice dominance and hearer distance ($r=.712$, $p<.01$). Voice intrusiveness was also correlated moderately with hearer distance ($r=.484$, $p<.01$). This raises the possibility that these variables were in fact measuring the same or overlapping underlying constructs. Further, there were moderate to large correlations between subscales of the VAY and BAVQ-R. Voice dominance was correlated with omnipotence and malevolence ($r=.605$, $p>.01$; $r=.560$, $p<.01$) as was voice intrusiveness ($r=.659$, $p<.01$; $r=.737$, $p<.01$). This would suggest a strong possibility that voice dominance and voice intrusiveness are in fact measuring similar or overlapping constructs to voice omnipotence and malevolence.

3.2.2 Hypothesis 3

Hypothesis three stated that relationships between both attachment anxiety and attachment avoidance and distress would be mediated by interpersonal processes in the hearer-voice relationship, beliefs about voices, and paranoia. Given the relatively small sample in the study it was not possible to test this

hypothesis using a single multiple regression analysis with multiple variables as predictors or mediators. However, it was possible to run a series of simple mediation analyses to test for the effects of mediation between attachment avoidance/anxiety and voice related distress/depression. Given the exploratory nature of this analysis and the number of analyses conducted caution needs to be exerted when interpreting the results due to the increased chances of a Type 1 error. In order to minimise the number of analyses run, potential mediators were first checked to ascertain correlations between them and both the IV and DV. For example, the potential mediator voice dominance correlated with both the IV attachment anxiety and the DV voice related distress. Consequently this was checked for mediation.

Table 4 shows a number of mediation analyses where attachment anxiety was the IV and voice distress or depression were the dependent variable (Table 5 shows similar analyses where attachment avoidance was the IV). For example, the mediational model of voice dominance as a mediator of the relationship between attachment avoidance and voice related distress was tested. As can be seen from table 6, there was a significant effect of attachment avoidance on voice dominance whilst controlling for voice related distress (=.7753, p=.001). There was a significant effect of voice dominance on voice related distress whilst controlling for attachment anxiety (=.1390, p=.001). The effect of attachment avoidance on voice distress whilst controlling for voice dominance was not significant (.0209, p=>.05), suggesting full mediation. Due to the number of analyses conducted 99% confidence intervals were used for bootstrapping. Results based on 10000 bootstrapped samples suggested that the indirect relationship between attachment avoidance and voice related distress through voice dominance was significant (IE lower 99% CI=.0411, upper 99% CI=.1984) at the p=.01 level, as 0 did not fall within the confidence intervals. This analysis confirmed a potential mediational

relationship, although results should be treated with caution due to the risk of a Type 1 error.

Table 4: Summary of mediation results for voice distress and depression with attachment anxiety as independent variable

* = significant at p=0.05

Dependent Variable	Mediator	Effect of IV on Mediator	Effect of Mediator on DV	Direct Effects	Indirect Effects
Voice Distress	VAY- Voice Dominance	.6861***	.1367***	.191	.0938**
	VAY -Voice Intrusiveness	.3519**	.1470***	.0612*	.0517**
	VAY- Hearer Distance	.5018***	.1402***	.0426	.0704**
	BAVQR- Omnipotence	.5685***	.1408***	.0329	.0800**
	BAVQR- Malevolence	.5213***	.1487***	.0354	.0775**
	BAVQR- Resistance	.5053**	.1256***	.0494	.0635**
	PADS- Persecution	1.1631***	.0778***	.0224	.0905**
	PADS- Deservedness	1.0003***	.0536***	.0593	.0536**
BDI	VAY- Voice Dominance	.6861***	.5368***	1.1782***	.3683
	VAY- Voice Intrusiveness	.3519**	.9344	1.5176***	.3288
	VAY- Hearer Dependence	.4206**	.2818	1.7279***	.1158
	VAY- Hearer Distance	.5018***	.2539	1.7280***	.1184
	BAVQR- Omnipotence	.5685***	1.3793***	1.0623***	.7841**
	BAVQR- Malevolence	.5213***	.9519*	1.3502***	.4962
	BAVQR- Resistance	.5053**	.6700*	1.507***	.3386
	PADS- Persecution	1.1631***	.9008***	.7883*	.10582**
	PADS- Deservedness	1.0003	.7213***	1.1249***	.7215**

** = significant at p=0.01
*** = significant at p=0.001

Table 5: Summary of mediation results for voice distress with attachment avoidance as independent variables

Dependent Variable	Mediator	Effect of IV on Mediator	Effect of Mediator on DV	Direct Effects	Indirect Effects
Voice Distress	VAY- Voice Dominance	.7753***	.1390***	.0209	.1075**
	VAY -Voice Intrusiveness	.5126***	.1579***	.0474	.0809**
	VAY- Hearer Distance	.3764*.	.1442***	.0741*	.0543
	BAVQR- Omnipotence	.7244***	.1514***	.0187	.1097**
	BAVQR- Malevolence	.5957***	.1543***	.0364	.0919**
	BAVQR- Resistance	.3813	.1305***	.0785**	.0498
	PADS- Persecution	1.5292***	.0879***	-.0061	.1344**
	PADS- Deservedness	1.5794***	.0600***	.0336	.0918**
BDI	VAY- Voice Dominance	.7733***	.5727	1.9913***	.4429
	VAY- Voice Intrusiveness	.5126***	.7052	2.0727***	.3615
	VAY- Hearer Dependence	.5118***	.2712	2.2954***	.1388
	VAY- Hearer Distance	.3764*	.5878	2.2130***	.2212
	BAVQR- Omnipotence	.7244***	.13024***	1.4908**	.9435**
	BAVQR- Malevolence	.5957***	.9069*	1.8618***	.5724
	BAVQR- Resistance	.3818	.8748**	2.1002***	.3340
	PADS- Persecution	1.5292***	.8602***	1.1188*	1.3154**
	PADS- Deservedness	1.0003***	.7213***	1.1249***	.7215**

* = significant at p=0.05
** = significant at p=0.01
*** = significant at p=0.001

The relationship between attachment avoidance and voice related distress was fully mediated by voice dominance (IE lower 99% CI=.0411, upper 99% CI=.1984), voice intrusiveness (IE lower 99% CI=.0165, upper 99% CI=.1697), omnipotence (IE lower 99% CI=.0266, upper 99% CI=.1782), malevolence (IE lower 99% CI=.0240, upper 99% CI=.1816), persecution (IE lower 99% CI=.0567, upper 99% CI=.2439) and deservedness of persecution (IE lower 99% CI=.0216, upper 99% CI=.1821). The above results are in support of hypothesis three.

Figure 3 provides a graphic representation of the partial mediation relationships observed between attachment avoidance and anxiety and depression. As might be expected, there were fewer mediational relationships between attachment anxiety/avoidance and depression, although the relationship between attachment anxiety and depression was partially mediated by omnipotence (IE lower 99% CI=.0297, upper 99% CI=1.6251), persecution (IE lower 99% CI=.4112, upper 99% CI=1.8475) and deservedness of persecution (IE lower 99% CI=.1037, upper

99% CI=1.3937). Similarly, attachment avoidance and depression was partially mediated by omnipotence (IE lower 99% CI=.1435, upper 99% CI=.2.3741), persecution (IE lower 99% CI=.4664, upper 99% CI=2.3747) and deservedness of persecution (IE lower 99% CI=.0825, upper 99% CI=1.3967).

Figure 2: Proposed mediational relationships between attachment avoidance/anxiety and voice related distress

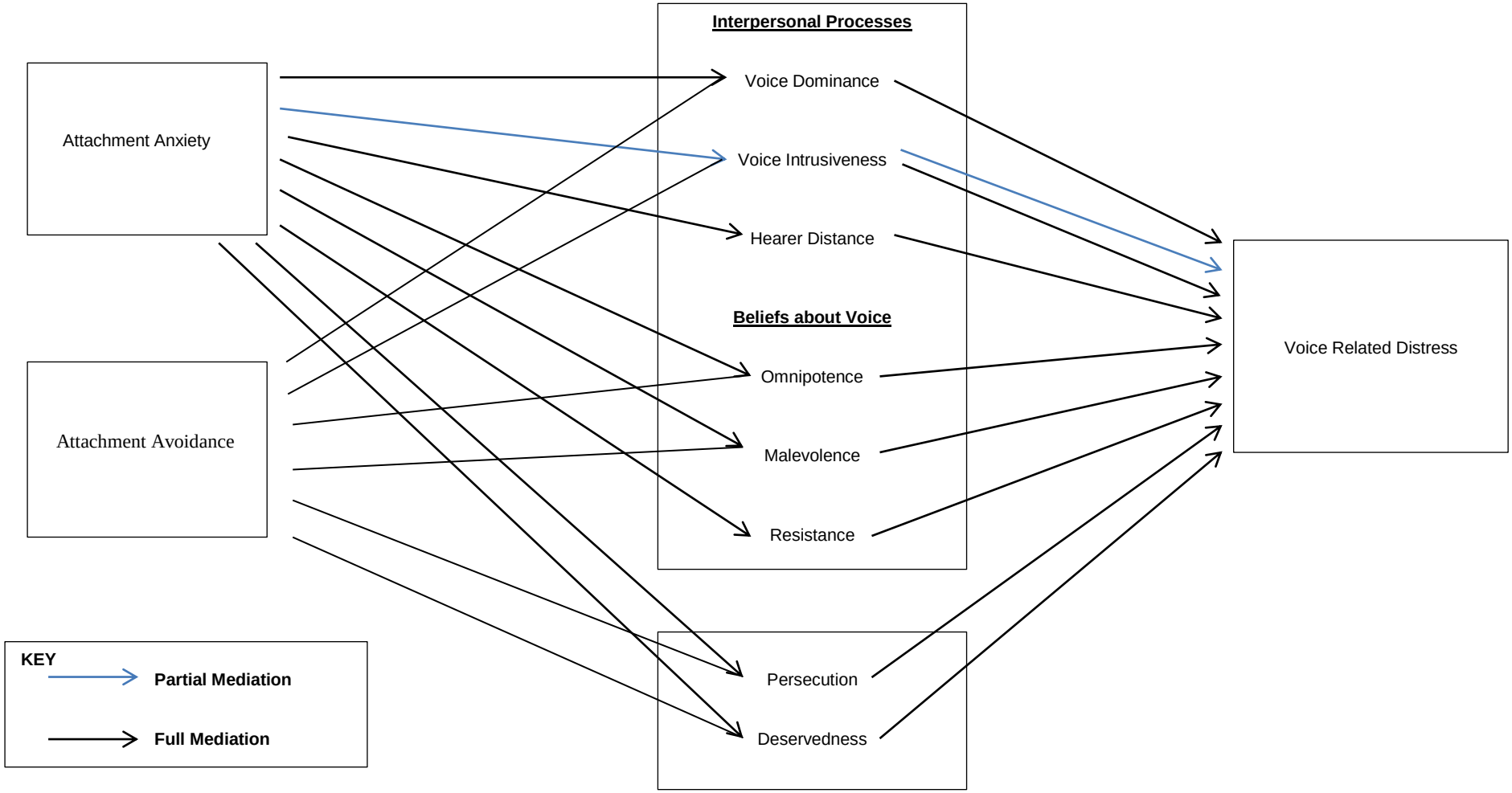
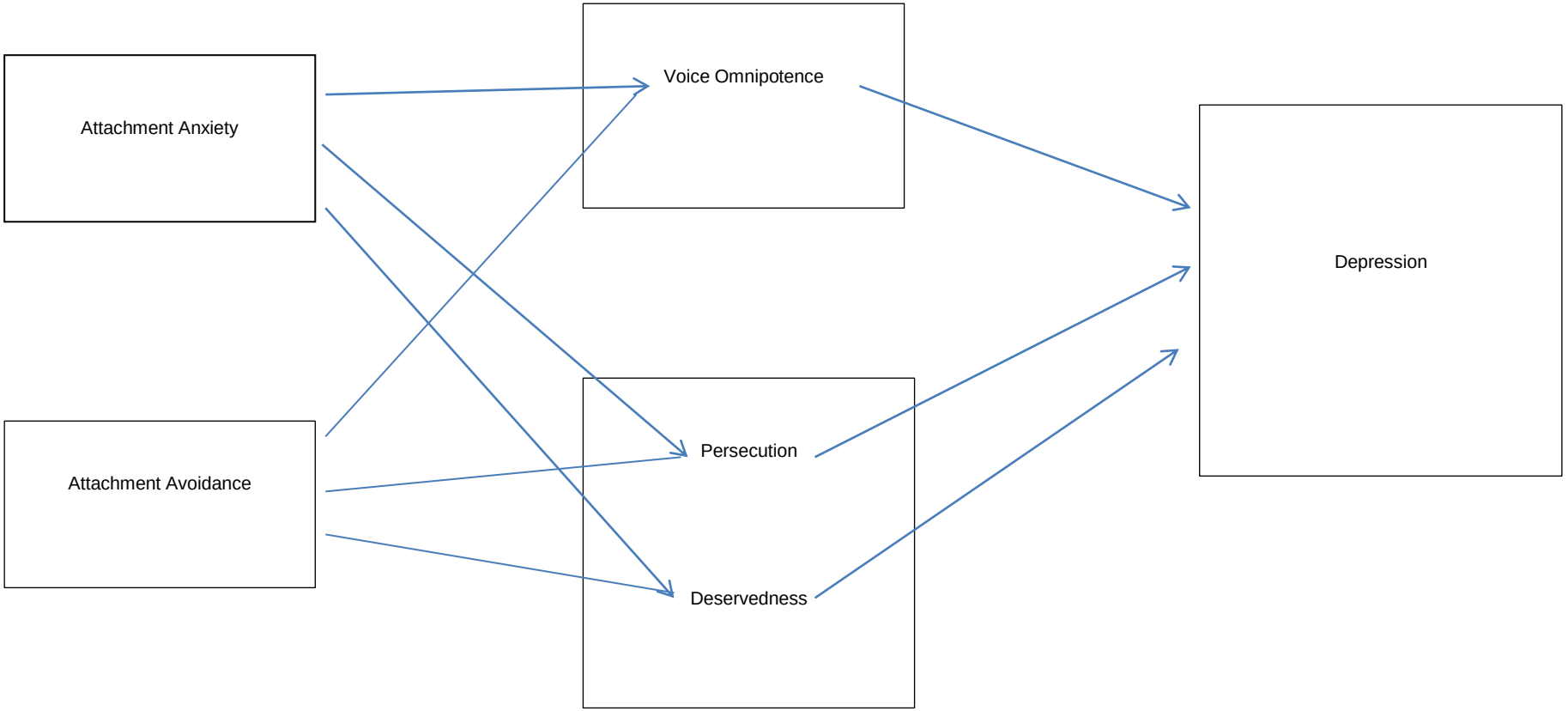


Figure 3: Proposed partial mediational relationships between attachment avoidance/anxiety and depression



4. Discussion

As predicted, attachment avoidance was associated with voice dominance, hearer distance and voice related distress. Further, as predicted, there was evidence that attachment anxiety was associated with voice intrusiveness, hearer dependence and voice related distress. Whilst some limited evidence of a relationship between attachment anxiety/avoidance and voice related distress mediated by voice variables was found, these should probably be viewed as preliminary results due to the limits of multiple testing in a small sample.

The associations between attachment and interpersonal processes in the voice-hearer relationship are consistent with previous research in this area suggesting that more general processes in social relationships are linked to processes in the voice-hearer relationship (Birchwood et al., 2000; Birchwood et al., 2004; Hayward, 2003). This might be expected based upon cognitive models of voice hearing which see interpersonal schemata or beliefs about self and other as underlying the relationship with voices (see Paulik (2011) for a review). Bowlby (1980) has described attachment as an interpersonal process whereby early interpersonal experiences are involved in the development of cognitive working models of the self and others in relationships, which are said to underlie future functioning in relationships. Given the hypothesised link in the literature between interpersonal schemata and the voice relationship, it makes sense that both attachment anxiety and avoidance, (which are linked to cognitive models of self and other; Bartholomew, 1992) would be linked with the voice relationship. It has been argued that working models and core beliefs share similarities in that they guide attention, generate expectations and influence interpretation of new information (Platts et al., 2002). However it has been argued elsewhere that what distinguishes attachment working models from core beliefs is a representation of the self in relation to others which includes emotional states as well as beliefs (Pietromonaco &

Feldman Barret, 2000) and Bowlby (1980) suggests that attachment working models are also linked with distress regulation.

Further, the associations between attachment and interpersonal processes in the voice-hearer relationship found in this study fit well with existing theory. Attachment anxiety is believed to arise from inconsistent or overly intrusive parenting or caregiving, and is associated with negative beliefs about the self, hypervigilence to signs of rejection and a tendency to be overwhelmed by negative affect. Attachment avoidance is thought to arise where there is more consistent criticism in early relationships and is associated with negative beliefs about others, avoidance of relationships and inhibition of emotion (Shaver & Mikulincer, 2002). Sorell et al. (2010) report links between voice intrusiveness, voice dominance, hearer distance and distress, with a negative although non-significant association between hearer dependence and distress. In the current study, attachment avoidance was associated with voice dominance, hearer distance and distress. This is consistent with findings that attachment avoidance is associated with criticism in early relationships, negative beliefs about others and avoidance of relationships. That attachment anxiety in the current study was associated with voice intrusiveness, hearer dependence and distress is consistent with attachment anxiety being linked with intrusive caregiving, hypervigilence to rejection and overwhelming affect.

However, it should be noted that there was a distinct lack of specificity among the associations found in the present study between attachment and subscales of the VAY and BAVQ-R meaning that the results need to be treated with caution. There are a number of potential explanations for this. First, it should be noted that attachment anxiety and attachment avoidance were significantly correlated, suggesting that participants may well have experienced both overly intrusive or inconsistent caregiving, along with consistent criticism or rejection in early relationships (although this is an inference given the cross-sectional nature of the

study). This would suggest that studying the effects of attachment avoidance and anxiety and their impact on the voice-hearer relationship in isolation may not capture the complexity of such a relationship, and large scale studies may be best placed to unpick this. Further, Shaver & Mikulincer (2002) discuss the difference between a general attachment style and specific working models of relationships with particular individuals. The PAM measures general adult attachment and there are clearly associations between attachment and voice related variables. However the lack of more specific relationships between attachment and particular voice related variables may suggest that an individual might develop particular working models related to their voices that differ fundamentally from what might be predicted from theory based upon a more general measure of attachment, given the differences between a "real" relationship and the relationship with a voice. Further, given the reported inter-correlations of subscales on the VAY, and between scales of the VAY and the BAVQ-R, it is quite possible that the lack of specificity observed in the results is linked to measurement of constructs that are essentially very similar and which need further investigation in large scale studies to delineate their independence from each other.

The mediation analyses in this study yielded some interesting results that are explicable within existing theoretical models. The relationship between attachment anxiety/avoidance and voice related distress as mediated by beliefs about voices is consistent with Birchwood et al.'s (2004) model of voice hearing. This model places interpersonal schema about subordination to others as underlying beliefs about voices and voice related distress and it is hypothesised that interpersonal schema come into existence through past trauma or attachment (Birchwood, 2003). Sorell et al. (2010) argue that interpersonal processes as measured by the VAY and beliefs about voices as measured by the BAVQ-R may in fact be similar underlying constructs measured cognitively or interpersonally, suggesting that the separate analyses with voice dominance/intrusiveness and voice omnipotence/malevolence

as mediators in the present study may have been testing one underlying construct of negative relating to a voice. Therefore it seems reasonable to conclude tentatively based upon the limited analysis in this study that increased attachment avoidance/anxiety impact on the relationship with the voice in a potentially negative way which in turn may lead to increased distress in the voice – hearer relationship.

Of interest in the present study was the association between attachment avoidance and distress (mediated by voice related variables and paranoia). Berry et al. (2011) did not find an association between attachment avoidance and distress, which was contrary to their hypotheses. This study did not find evidence for an indirect effect of attachment avoidance on voice related distress mediated by distance from the voice or resistance, but rather, evidence of a more direct effect of attachment avoidance on distress whilst controlling for these variables. One might think that this indirect effect would be significant, given that attachment avoidance is associated with avoidance of relationships and distance in the voice relationship is associated with distress (Sorell et al, 2010; Vaughan & Fowler, 2004). The lack of an indirect effect and the more direct relationship between attachment avoidance and distress might be explained by considering that despite attempts made by voice hearers to escape their voice, which may be powerful, the internal and perhaps inescapable nature of voices may mean that attempts to escape or resist can only ever be partially successful. This may explain why attachment avoidance predicts voice related distress over and above an attempted distancing from the voice.

The link between attachment avoidance/anxiety and voice related distress was also found to be mediated by persecution and deservedness. This might be expected given Pickering et al.'s (2008) finding that a link between attachment and hallucination proneness did not remain once paranoia had been controlled for. The relationship between attachment and paranoia has been considered by Chadwick & Trower (1995) who suggested a link between type of attachment (insecure – anxious or avoidant) and types of paranoia (poor me vs. bad me). However this view

has been challenged by Melo et al. (2006) who provided evidence that the type of paranoia was not as fixed as suggested by Chadwick and Trower, but rather something that may change over time. Alternatively, Bentall (2001) has conceptualised paranoia as a consequence of making attributions of behaviour to self or other with the aim (without conscious awareness) of preserving self-esteem in the face of threatening or negative life events. Further, it is possible that the finding that paranoia mediated this relationship may be linked with the presence of a delusional system incorporated in the experience of voice hearing, suggested by Birchwood et al. (2004) to be associated with distress, and included in contemporary models of hearing voices (e.g. Waters et al., 2012). The finding in the present study that both attachment anxiety and avoidance were associated with the different kinds of paranoia suggested support for the idea that paranoia is more changeable and less fixed.

As might be expected, there were less mediated relationships in the current study between attachment anxiety/avoidance and depression than between attachment and voice related distress. However, this relationship was mediated by beliefs about voice omnipotence and by persecution and deservedness of persecution. Beliefs about voice omnipotence as a mediator of this relationship might be expected given that the Birchwood et al. (2004) model links depression and distress with interpersonal schema, and in light of beliefs about voice power being specifically related to depression (Birchwood & Chadwick, 1997). Paranoia as a mediator of the relationship between attachment and depression may be accounted for by an association between paranoia and depression (Bentall, 2001).

4.1 Limitations and Suggested Future Research

There are a number of limitations to the present study. First, the largely white sample mean that the results may potentially lack external validity. That said, there

is no theoretical reason to suggest that voice – hearer relationships would be different across different ethnicities. Further, it might be argued that given the nature of on-line recruitment participants were limited to those who had access to a computer, which may have systemically excluded voice hearers with more chronic psychosis. A further limitation of the present study is the relatively small sample size (n=44) and the proposed mediational relationships presented. Whilst bootstrapping is a non – parametric method for testing mediation and is acceptable for use in small sample sizes this is only with regard to testing simple mediational relationships. The mediational relationships presented in this study are undoubtedly more complex than simple mediation relationships and involve multiple variables. Consequently results should be interpreted with caution. An aim of further research should be to examine the potential impact of these multiple variables on the relationship with voices in large samples and to delineate such relationships using more robust statistical analysis. Further, given the number of statistical tests carried out in this study, there is a heightened risk of Type 1 Error. In addition, mediational analyses imply causation and whilst theory might predict the relationships tested for, without further research with much larger sample sizes and using multiple regression or structural equation modelling the conclusions that can be drawn are limited. Attachment is a lifespan theory (Bowlby, 1980) however the design employed here was cross-sectional and therefore causation cannot be assumed on logical grounds; the area of attachment and relationship with voices would benefit from longitudinal research to confirm a causative role for early attachment experiences impacting on the relationship with voices. Further, as discussed above, there is very likely some overlap of concepts in the measures used in this study which would need further exploration in larger sample sizes. Another limitation of the current study was that the measure of distress in relation to hearing voices was a simple 5 point Likert scale designed specifically for the study. Unfortunately no previously validated self-

report measure specifically measuring distress was available, and clinician administered measures were not feasible given the design of the study.

4.2 Integration and Clinical Implications

Despite the above limitations it would seem there is evidence that attachment has an impact on the relationship with voices and this is consistent with previous research (Berry et al., 2011). This links well with research investigating the link between trauma and hearing voices (e.g. see McCarthy-Jones (2010) for review of childhood sexual abuse and hearing voices). Further, one causal theory of voice hearing is the inner-speech model (see Allen, Aleman & McGuire (2007) for a review of neuroimaging and behavioural studies in support of this theory). One conceptualisation of the inner-speech explanation of hearing voices which takes into account the impact of attachment is that suggested by Fernyhough (2004). This model draws on Vygotskian ideas and it is assumed that inner speech comes into existence through verbal exchanges with others, which eventually become internalised and ends with condensed inner-speech or thinking in pure meanings. The model proposes that the experience of hearing voices can be explained via a re-expansion model where condensed inner-speech becomes re-expanded under conditions of stress and in the absence of external stimuli is experienced as a voice. The finding that attachment avoidance and anxiety are associated with the relationship with voices may lend support to such a model. Of note, Jones & Fernyhough (2007) have provided support for this model from neuroimaging studies.

Clinically, interventions specifically for voice hearing are often considered as a part of a larger package of therapy for psychosis (Wykes, 2004). Further, despite evidence that voice related beliefs are central to voice related distress (Mawson et al., 2010), interventions that target voice related beliefs do not always correspond to a reduction in distress (Ruddle et al., 2011; Farhall et al., 2007). The current study provides further evidence that relational processes found to affect relationships in

the external world also have relevance to the relationship with voices, and should therefore be considered and perhaps addressed in any therapy that aims to reduce distress with regard to voice hearing. Person - centred cognitive therapy is one such approach that has been applied to hearing voices (Chadwick, 2006). The approach considers work on negative self-schemata and self- representation as key to developing a metacognitive perspective of self. In addition, Hayward (2009) has provided some promising early results using Relating Therapy for voices, which considers interpersonal characteristics in the voice relationship. The current study provides additional support for these therapeutic approaches and suggests that attachment may be a complimentary theory that may enhance these therapeutic approaches.

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Part 3: Critical Appraisal

1. Introduction

This paper will discuss the process of completing this research project by first considering the context of hearing voices research literature, and the personal context of how the research emerged, before considering some of the difficulties in recruitment. It will then consider some of the methodological limitations of the study, and that of internet research more broadly. Further, there will be some consideration of the constructs that were measured in the study and the overlap with other similar concepts that have been studied in the hearing voices literature, as well as consideration of qualitative feedback from participants.

2. Hearing Voices Research

There has been an increased interest in the area of hearing voices research in recent years, as evidenced by the number of reviews in the area published in the last few years. In particular, there have been big advances in the literature on brain imaging studies that use more advanced statistical procedures for investigating both structural and functional brain differences in those who hear voices. For example, recent meta-analytic studies in this area have utilised imaging techniques that take a whole brain approach, as opposed to a region of interest approach, and have found some relatively robust findings across studies implicating areas of the brain involved in language and memory (Jardri et al., 2011; Palaniyapan et al., 2012). Neuroimaging research has also contributed to causal theories of hearing voices, for example, an inner-speech hypothesis of voice hearing (Allen et al., 2007), among others. However, the neuroimaging literature on hearing voices has been blighted by small sample sizes in studies, making generalisation questionable, along with an almost exclusive focus on people diagnosed with schizophrenia and other clinical voice hearers. Where meta-analyses have been possible sample sizes have still been small (e.g. 350 participants in Palaniyapan et al., 2012).

Psychological research has contributed to the understanding of hearing voices considerably both in terms of laboratory research attempting to understand more causal mechanisms (see Allen et al., 2007) and cross-sectional research attempting to understand factors involved in the maintenance of hearing voices and the link with distress (Birchwood et al., 2004). Cross-sectional research into hearing voices has traditionally benefited from larger sample sizes than neuropsychiatric research and consequently the results may be considered more generalizable. A consistent finding in the literature is that a person's way of interacting with others in their external world is mirrored in the way they interact with their voice, whether it be conceptualised interpersonally (Hayward, 2003; Vaughan & Fowler, 2004; Sorell et al., 2010) or in terms of beliefs about voices linked to social rank and subordination (Birchwood et al., 2001; Birchwood et al., 2004). Psychological therapy for hearing voices is often delivered within broader therapy models for schizophrenia (Steel, 2008) and despite the consistent finding that distress in voice hearing is linked with the beliefs that a person has about their voice, attempts in therapy to target and modify such beliefs do not always lead to a reduction in distress (Mawson et al., 2010). The empirical study in this thesis therefore sits within the cross-sectional psychological literature on hearing voices, and is an attempt to further understand potential factors, specifically attachment, and how it may be linked with interpersonal factors and beliefs about voices in affecting distress. Consequently it was hoped that it would add to this literature in the hope of informing formulation and intervention for voice hearers.

3. Personal Context of Research

I have always been interested in psychosis more broadly and the experience of hearing voices more specifically. Before training in clinical psychology one of my NHS posts was working as a mental health worker in a crisis resolution team, where I spent a lot of time working with people who heard voices (across a range of

diagnoses) in a variety of environments but mostly in their homes. Whilst I was not formally undertaking any psychological therapy within this role I often spoke with clients about their voices. I was also struck by the almost exclusive medical treatment of psychosis in this team and the lack of psychological thinking about any potential meaning behind "symptoms" of psychosis. A particularly poignant moment was when, describing the content of a client's voices in a meeting, I was told by a psychiatrist that the client was "just ill and needs medication", and that what his voices said didn't matter!

In thinking about a research project for the clinical psychology training I was fairly certain that I wanted to explore the relationship that voice hearers have with their voices. I came across the work of Max Birchwood and colleagues on beliefs about voices and social schemata, and also Hayward and colleagues looking at interpersonal processes in hearing voices. What struck me when reading these works was that there was often a mention of social schemata or interpersonal processes being linked with early experiences or with attachment, but there did not appear to be any research specifically investigating attachment and the relationship with voices, although Katherine Berry's work on attachment and psychosis and the development of the Psychosis Attachment Measure came up in a search. On contacting Mark Hayward and Katherine Berry separately enquiring about use of their measures for this thesis, I received an email back from Katherine Berry on behalf of them both stating that the overlap between attachment and interpersonal processes in the voice hearing experience was something that they had considered together and felt would be worthwhile pursuing. Katherine Berry subsequently read a draft of the research proposal and suggested it was along the right lines which gave me confidence to pursue the idea.

4. Recruitment

I had initial meetings with members of the London Hearing Voices Network in order to discuss the potential for discussing the research with its members, particularly members of hearing voices groups in the London area. Initial meetings were promising, and it was suggested that it would be possible for research to be discussed by group facilitators with group members. It was also agreed that the study would be publicised by Intervoice, the international community for voice hearers, via their newsletter, website, facebook and twitter. Despite promising early contact with these networks in the design stages of the project, when it came to the data collection phase I realised that the reality of recruitment was going to be more challenging than I had anticipated, particularly as my previous contacts proved difficult to reach.

I eventually found the contacts for the hearing voices group facilitators via a different contact in the same organisation, and began to make contact. However, a large number of the non-HNS groups had finished, and where still running the group facilitators that I spoke to, whilst positive about the project, were not overly optimistic about the number of people that may take up the opportunity to participate. It also became apparent that another DClinPsy project from a different course was attempting to recruit the same population. Following these attempts at recruitment I focused my efforts on online recruitment through Intervoice. Most effective appeared to be posting about the study on the facebook page, which usually resulted in two or three more participants. I had to resist the temptation to post about the project too regularly, as I did not wish to intrude on a space for voice hearers too much with research, as the space was often used by voice hearers from all over the world to discuss their often distressing experiences and to seek advice from other hearers. The administrator for the page, and someone involved with running Intervoice, was a key relationship without which it would have been difficult to achieve the number of participants I did in the end. The administrator often “liked” my posts about the

research and commented on the posts encouraging people to participate, and I feel that without his endorsement of the study recruitment would have been more difficult. A further point to mention is the anxiety that I often felt with this on-line method of recruitment; it felt that the study was just out there on the internet and that I had very little control over whether people would take part or even be interested, and I consequently often worried about whether I would reach the numbers required from the power analysis. In the event sufficient numbers were achieved and I owe this to the Intervoice network for their continued support. Perhaps a consideration for further online research of this nature would be to include a question about where participants saw the study advertised, so that recruitment could be focused in the more fruitful avenues.

5. Methodological Limitations

This study was primarily interested in the experience of hearing voices and the relationship a hearer has with their voice, regardless of diagnosis or clinical status. However, a potential weakness of the study could be that there was very little information collected about participants and their psychiatric history, and about the severity of their current mental health difficulties, including for example, presence or absence of other symptoms of psychosis such as delusions, meaning that the effects of these variables could not be taken into account in the analysis. The decision not to include these measures was somewhat pragmatic, as the study being internet based precluded a clinical interview to assess for overall symptoms using a standardised measure. Also, in keeping with a complaint-based approach (Bentall, 2006) as opposed to a categorical one, it felt important to keep the focus specifically on hearing voices. In the end this precluded examining the effect of other difficulties such as delusions on the voice relationship, which may be considered important in predicting voice related distress (Birchwood et al., 2004).

Further, there are a number of questions that arise about generalizability of the results to other voice hearers, given that this study was conducted on-line. First, it has been suggested that samples accessed online differ in systematic ways from samples accessed via more traditional methods. For example, Hewson (2003) suggests that internet samples have been observed to be typically more white, middle-class and male than traditional samples. The sample in the present study was largely white, possibly biasing the results and reducing generalizability. It is also possible that on-line recruitment may have systematically excluded people with more chronic mental health problems, who perhaps are less likely to have access to computers, or indeed, be interested in taking part in research in the first place. Hewson (2003) also suggests that a further compromise in the validity of online research is the lack of control of conditions under which participants take part. For example, it is highly possible that participants may have been in busy environments with possible stressors that may have influenced responses, or been under the influence of drugs or alcohol, both of which would be easier to observe and control for if measures had been administered face to face.

In addition, a further problem with internet research is controlling for participants providing multiple responses, particularly where payment is offered. It was possible to prevent the same individuals from responding more than once as the UCL internet survey software "Opinio" has an option to do this via recording respondents web addresses and preventing responses from the same address. A further point raised by Hewson (2003) is that posting about studies on social media should be carefully considered, and monitored to see whether participants discuss the study in a public forum which may compromise the validity of the study. As will be discussed below, participants did discuss the study in a public forum (the Intervoice facebook page), and it is possible that this compromised the internal validity of the study. That said, I was able to monitor the discussion and it did not discuss specific items or content, but was more general.

6. Measurement of Constructs

There was considerable correlation between subscales of the VAY (Hayward, 2008) and subscales of the BAVQ-R (Chadwick et al., 2000). Sorell et al. (2010) argue that the VAY and the BAVQ-R may in fact be examining similar underlying aspects of the voice – hearer relationship, from interpersonal and cognitive perspectives respectively. A further consideration arises with regard to the development of the VAY. The BAVQ-R was used as a measure of concurrent validity in the design of the VAY, and consequently it may be very difficult to delineate the similarities and differences between these two measures without further larger scale studies which use more sophisticated statistical techniques. In addition, the PADS (Melo et al., 2009) used the BDI (Beck et al., 1996) as a measure of concurrent validity and therefore this may have compromised the analysis of the link between paranoia and depression. In hindsight perhaps it would have been more appropriate to include an alternative measure of depression in the current study.

A further consideration maybe the link between attachment, social rank, beliefs about voices and voice related distress. Birchwood et al. (2004) suggest that social schemata, originating from social rank or attachment, underlie beliefs about voices and voice related distress. It might be argued that social rank and attachment share similarities in that they both consider beliefs about the self in relation to another. However, recent research has suggested that attachment and social rank systems affect depression and anxiety in adolescence through different pathways (Irons & Gilbert, 2005) and operate on mood in bipolar disorder in different ways (Gilbert et al., 2007). It would therefore have been interesting to include measures of social rank behaviour in the current study in order to examine the links between social rank and the variables measured in the current study. The total numbers recruited in this study would have precluded statistical analyses which were able to

understand the complexity of these relationships and perhaps this would be best left to larger scale studies.

7. Qualitative Feedback

A significant weakness of this study was that at the design stage plans were not made for collecting qualitative feedback from participants about their experience of completing the research, which would have been easy to collect by adding a simple free text box on the study page. In fact, as discussed above, participants took the opportunity to give their feedback about the study on the facebook page. Overall, participants responded warmly to the research and felt it positive that research into hearing voices was being conducted. That said, a number of participants raised the concern that the measures in the study were overly focused on negative aspects of the voice – hearer relationship, and consequently failed to capture relevant aspects of people's experience. Whilst including more measures would not have been practical given the size of the study, this highlights the importance of future research focusing on more positive aspects of the relationship with voices. Further, participants also commented that it was often difficult for them to answer some questions as measures asked them to focus on their most dominant voice if they had more than one, whereas some said that they had more than one voice but not one dominant voice. This raises the issue of capturing the complexity of an experience such as hearing voices via self-report measures. Several voice hearers who completed the study, and who seemed well informed about the quantitative vs. qualitative research debate, suggested that such complexity may be better captured by qualitative methods. This would imply that further qualitative research into the relationship with voices would be both acceptable and potentially useful to voice hearers.

7. Summary

This review has considered the place of the current research study within research on hearing voices more broadly, as well as discussing the personal context of the research. Despite the methodological limitations mentioned above, the current research provides evidence in support of social processes more generally being mirrored in the relationship with voices and clinically would suggest that attachment anxiety and avoidance may be important variables to consider when working with voice hearers, either interpersonally or cognitively. On a personal note I feel that this study has enabled me to learn a considerable amount both about the theoretical and practical considerations of designing and carrying out research in hard to recruit groups. I have learned the benefit of building relationships with those involved in the community of interest when conducting research and without whose support the current study may not have been successful. Further, I hope that this research will add to the existing literature and that it may have a positive impact in some way on the lives of those who are distressed by their voice hearing.

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