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Submission for the journal ‘Cognitive Neuropsychiatry’

**A preliminary investigation into theory of mind and attributional style in adults
with grandiose delusions**

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Abstract

Introduction. A preliminary cognitive model of grandiose delusions has been put forward suggesting that persecutory and grandiose delusions shared distinct, yet overlapping psychological processes (Knowles, McCarthy-Jones & Rowse, 2011). This study aims to test this model and hypothesises that participants experiencing grandiose delusions may demonstrate a Theory of Mind (ToM) impairment and differences in attributional style compared to a control group.

Methods. A cross-sectional design compared the performance of 18 individuals with grandiose delusions to a control group of 14 participants with depression. ToM was measured using a non-verbal joke appreciation task and a verbal stories task. Attributional style was measured using the Internal, Personal and Situational Attributions Questionnaire.

Results. Participants experiencing grandiose delusions performed significantly worse on both ToM tasks compared to controls. Furthermore, these participants provided significantly more atypical answers when explaining the joke behind the ToM cartoons. No differences for subjective funniness ratings or attributional style were found.

Conclusions. This preliminary study indicated participants experiencing grandiose delusions have theory of mind impairments which may contribute to the maintenance of this symptom.

A Preliminary Investigation into ‘Theory of Mind’ and ‘Attributional Style’ in Adults with Grandiose Delusions

Grandiose delusions are defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) as “delusions of inflated worth, power, knowledge, identity, or special relationship to a deity or famous person” (American Psychological Association, 2000). After persecutory delusions, grandiose delusions are reported to be one of the most common types of delusion in psychosis (Applebaum et al., 1999) and the most common symptom in bipolar mania (Dunayevich & Keck, 2000; Goodwin & Jamison, 1990; Turkington & Kingdon, 1996).

Recently, a preliminary cognitive model of grandiose delusions has suggested that persecutory and grandiose delusions shared distinct, yet overlapping psychological processes in the maintenance of such delusional ideation (Knowles et al., 2011). One of these include the ability to correctly interpret and predict the mental states of other people; theory of mind (ToM). People experiencing psychosis have been shown to have difficulties with ToM tasks (e.g. Corcoran 2003; Corcoran & Frith, 2003; Frith, 2004), even at a first episode of psychosis (Bertrand, et al., 2007). There is also a growing body of research into ToM performance in affective disorders (Bonshtein et al., 2006; Bora et al., 2005; Bora et al., 2009; Corcoran et al. 2008; Doody et al., 1998; Kerr et al., 2003; Inoue et al., 2006; Lahera et al., 2008; Malhi et al., 2008; Montag et al. 2010; Schenkel et al., 2008).

Several studies have since taken a transdiagnostic symptom-focused approach to exploring ToM performance. In a critical review by Bentall et al. (2001), it was concluded that individuals with persecutory delusions perform more poorly than both psychiatric and non-psychiatric comparison groups on ToM tasks. Recently, Harrington, et al. (2005a) reported that the ToM deficit was only observed in those participants with schizophrenia who also had persecutory delusions. Corcoran et al.

(2008) found poor performance on ToM tasks in adults with persecutory delusions irrespective of diagnosis and found that participants' performance was correlated with the degree of distress caused by this symptom. However, not all studies have consistently replicated the specific relationship between ToM impairment and persecutory delusions. It has been suggested that these inconsistent findings may arise as a result of the nature of the tasks employed to assess ToM (Shryane et al, 2008; Corcoran et al., 2011), with some studies demonstrating that the relationship between ToM difficulties and positive psychotic symptoms is partially mediated by IQ (Harrington et al., 2005a). Furthermore, Freeman (2007) proposes the possibility of depression or grandiose ideation in people experiencing paranoia could have a role to play in the mixed ToM results and further research is warranted.

A second cognitive process that is pertinent to the relationship between ToM and delusions is the role of attributional style. Attributions are the causal explanations that individuals give for their own behaviour and that of others (Fiske & Taylor, 1991). In a non-clinical population, there is a slight tendency to attribute negative events to external factors and positive events to the self, a pattern known as the self-serving bias (Mezulis et al., 2004). Individuals with psychosis show these biases to a greater extent. Bentall and Kinderman's (1998) model proposes that persecutory delusions are the product of two mechanisms: a tendency to avoid internal (self-blaming) attributions for negative events, and an inability to take into account the complexities of the situation-person interaction, a skill that is likely to be honed through ToM skills. These factors give rise to an 'externalising bias'; an exaggerated tendency to assign blame outside of the self for negative events, and the 'personalising bias'; an exaggerated tendency to blame other people rather than circumstances, situations or contexts (Craig et al., 2004; Janssen et al., 2006). The

paranoid person's avoidance of internal attributions for negative events may reflect a dysfunctional strategy for regulating self-esteem (Kaney & Bentall, 1989; Bentall et al., 1991; Candido & Romney, 1990; Lyon et al., 1994; Fear et al., 1996; Sharp et al., 1997; Young & Bentall, 1997). This theory has been labelled the delusions-as-defence theory (Bentall et al., 1994), suggesting that this mechanism is an extreme form of the self-serving bias found in the general population (Kinderman et al., 1998).

Knowles et al. (2011) propose that as a result of negative fluctuations in self-esteem, individuals with grandiose delusions may believe they have a special power or ability that others wish to steal or destroy, resulting in secondary persecutory delusions. Alternatively, grandiose delusions may emerge from existing persecutory delusions, since positive fluctuations in self-esteem may lead the individual to believe that the intention of others to persecute or follow them are due to something that the individual holds of great worth, thus explaining the frequent co-morbidity between these delusion subtypes. In the context of grandiose ideation specifically, we might expect to observe more internal personal attributions for positive events and more external attributions for negative events (Jolley et al., 2006). This would accord with Bentall and Kinderman's theory (1998) in that the individual may make more explicit internal attributions for positive events in order to regulate self-esteem.

The Present Study

Although more researchers are now adopting a symptom orientated approach to improve understanding of psychiatric disorders (Bentall et al., 1988; Bentall, 2003), little research has focussed on grandiose delusions (Knowles et al., 2011). This study aims to investigate two cognitive processes in people experiencing grandiose delusions. Specifically, it was hypothesised that:

- (i) Participants with grandiose delusions will score poorly on all types of ToM tasks (verbal and non-verbal, first-order and second-order ToM) in comparison to depressed control participants.
- (ii) Participants with grandiose delusions will show a strong self-serving attributional bias, making excessively external (blaming other people and circumstances) attributions for negative events and excessively internal attributions for positive events. This will contrast to the typical depressive attributional style seen in the unipolar depressed 'psychiatric control' group.

Method

Participants

This study adopted a cross-sectional design to investigate performance on two ToM and two attributional style tasks in currently depressed and grandiose populations. Participants with a history of central nervous system disease or head injury, a learning disability or pervasive developmental disorder were excluded from this study as these co-morbidities would have been likely to impact on IQ and cognitive performance. The experimental and control groups were matched for age, sex ratio and IQ.

Experimental group

Eighteen people (ten women) with a DSM –IV (American Psychiatric Association, 2000) diagnosis of bipolar disorder (n=14), schizophrenia (n=2) or schizoaffective disorder (n=2) were recruited to the experimental group. Participants were aged between 18 and 65 years ($M_{\text{age}} = 43.4$ years, $SD = 9.1$). Only one participant was African-Caribbean, while the rest of the sample was white-British.

Controls

The depressed control group comprised 14 participants ($M_{\text{age}} = 43.5$ years, $SD = 13$) with a primary diagnosis of depression (as defined by the DSM-IV). Nine members of the group were women. Participants were recruited via an Improving Access to Psychological Therapies (IAPT) service.

Procedure

The study received ethical approval from the South Yorkshire NHS Ethics Committee. The nature of the study was explained in participant information sheets and reiterated by the researcher during the meeting. The questionnaires and tasks were administered in a fixed order during a single session. On completion of all measures, participants were verbally debriefed about the aims of the study.

Measures

PDI-21

The presence of DSM-IV defined grandiose delusions was confirmed by the clinician involved in the care of all participants in this group and all participants endorsed either item 6 (Do you ever feel as if you are, or destined to be someone very important?) or 7 (Do you ever feel that you are a very special or unusual person?) of the short form of the Peters Delusion Inventory (PDI-21, Peters, Joseph, Day & Garety, 2004).

The PDI-21 (Peters et al., 2004) is widely used as a measure of delusion proneness in clinical and non-clinical research on persecutory (Corcoran et al. 2008; Moore et al. 2006) and grandiose ideation (Armando et al., 2010; Jones & Fernyhough, 2007; Peters et al. 1999; Scott et al., 2006; Verdoux, et al., 1998). The PDI -21 provides information on the total number of items endorsed (out of 21), total

distress, preoccupation and conviction (a score of up to 105 for each dimension), and total delusional ideation (the sum of all scores which can be added up to 336).

Hospital Anxiety and Depression Scale (HADS)

The HADS (Zigmond & Snaith, 1983) was administered to both groups to measure differences in depression and anxiety between both groups.

Altman self-rating mania scale

The ASRM (Altman et al., 1997) was administered to measure current symptoms of mania. This measure has been shown to correlate well with the Clinician Administered Rating Scale-Mania (CARS-M; Altman et al., 1994, $r = 0.766$).

Wechsler Abbreviated Scale of Intelligence (WASI)

The two-subtest version of the WASI (Wechsler, 1999) has been used in previous studies exploring ToM in paranoia (e.g. Corcoran et al. 2008; Langdon et al., 2010; Moore et al. 2006). This general estimate of current intellectual ability allowed an exploration of whether socio-cognitive functioning was independent of IQ.

The Stories Task

Harrington et al. (2005a) suggest that future research should maintain a greater consistency in the ToM tasks employed by different research groups to facilitate comparisons between results. Therefore to maintain consistency with the existing research in this field, the most commonly used task for assessing theory of mind was adopted: the first and second order false-belief task. This task is brief and makes minimal demands on participants' cognitive resources (Kerr et al. 2003) and has been found to have good validity for participants of average intellectual ability (Shryane et al., 2008). Four short stories (as previously used by Moore et al. 2006, Corcoran et al. 2008 and Shryane et al. 2008) were read out loud to participants, who were simultaneously shown a series of cartoon drawings depicting the events in each story.

Two of the stories assess the ability to understand states of false belief and two assess a character's intention to deceive. All four stories were designed to contain both a first-order question (when the contents of a single person's mind must be inferred) followed by a second-order question (where the contents of two people's minds must be inferred). In addition, participants were also asked questions that tested their understanding of the state of the world (i.e. a reality question), and additional questions of memory and non-mental state inference. Responses to all questions were recorded as correct or incorrect.

The Joke Appreciation Task

Researchers should ideally use a range of ToM tasks as they are heterogeneous and differentially sensitive to IQ (Harrington et al., 2005a; Shryane et al., 2008). Thus, the current study also employed a non-verbal visual joke appreciation task which has been shown to discriminate between people with a diagnosis of schizophrenia and non-clinical controls (e.g. Corcoran et al., 1997; Marjoram et al. 2005). A selection of 10 caption-less cartoons (taken from the set used by Gallagher et al. 2000) were shown one at a time in a fixed pseudorandom order, and participants were asked to "explain the joke" by providing a short account of their interpretation of the joke's meaning. Responses were given a score between 0 (no reference) to 3 (clear direct reference/mention) provide an index of the overall extent to which participants provide mental state explanations. Five of the jokes could be understood and appreciated purely at a physical or behavioural level although they can evoke mental state inferences too. The other five jokes definitely require an understanding of one or more of the characters' mental states in order to understand them. The scores given for each of the jokes were summed to give an index of overall ToM. Participants were also asked to subjectively grade each cartoon for humour on a scale of 1-5. This

was for the purpose of comparison between both groups and to explore whether the level of humour detected correlates with the participants' ability to infer ToM in the jokes.

Given that some studies have found normal appreciation with impaired comprehension of humour in adults experiencing psychosis (e.g. Marjoram et al., 2005; 2006; Tsoi et al., 2008; Ecker et al., 1973), it is possible that individuals experiencing psychosis may find different aspects of the joke funny compared to those without psychotic symptoms (Corcoran, 2008). This study therefore also investigated 'typicality'. To do so, the narrative interpretations of jokes were rated as either typical/common or atypical/uncommon.

IPSAQ

The IPSAQ is a self-report 32 item questionnaire which describes 16 positive and 16 negative social situations (e.g. 'a friend thinks you are interesting') presented in a fixed pseudorandom order. The participant is asked to write down the single most likely cause for this and to categorize this cause as something about themselves (internal self-attribution), something about other people (external-personal attribution) or something about the situation (external-situation attribution). These six subscales (three for positive events and three for negative events) can then be used to compute two cognitive bias scores which quantify whether the participant has a tendency to externalise or to personalise attributions for negative and positive social events. The 'externalising bias' is calculated by subtracting the number of negative self-attributions from the number of positive self-attributions. A positive externalising bias score indicates a strong self-serving bias in which the respondent attributes cause to themselves less for negative events than for positive events. The percentage of externally attributed negative events (external-personal or external-situational) that

were attributed to other people is calculated to give the ‘personalising bias’ score. A personalising bias score greater than 0.5 represents a tendency to attribute the causes of negative events to other people as opposed to situations. These two scores have acceptable levels of reliability (Cronbach’s alphas of 0.7189 and 0.7609 respectively, Kinderman & Bentall, 1996).

Results

Both groups were matched for age, gender, education, years of illness, medication, vocabulary and matrix reasoning scores (see Table 1). As expected, there were significant differences between groups for depression, anxiety, mania and the total PDI score, with the depressed group scoring higher for HADS depression ($t(29.21) = 5.15, p < .0001$) and anxiety ($t(29.09) = 4.28, p < .0001$), and the psychoses group having higher mania ($t(24.08) = -3.96, p < 0.001$) and PDI scores ($t(30) = -2.11, p = .043$).

INSERT TABLE 1 ABOUT HERE

Jokes task.

The grandiose group performed significantly worse compared to depressed controls (see Table 2) on the ToM understanding of the cartoon jokes ($t(30) = 3.65, p < .001, r = .55$). There was also a significant difference between the groups for the number of atypical responses ($F(1, 29) = 8.583, p = .007$). No group differences existed for the perceived funniness of the jokes ($t(30) = -0.799, p = .431$).

INSERT TABLE 2 ABOUT HERE

Theory of Mind Stories. Overall, the grandiose group performed significantly worse on the theory of mind stories task ($t(30) = 3.07, p = 0.05$). The grandiose group also answered more of the memory control questions embedded in these stories incorrectly ($t(22.71) = 3.45, p = .02$). This was particularly significant in the case of the second-order memory questions ($t(23.07) = 3.32, p = .003$). However, a one-way ANCOVA revealed that after controlling for the significant group difference in performance on the total memory questions the ToM group difference remained significant ($F(1, 29) = 8.306, p = .007, u = 0.22$). There was no difference between groups existed for first-order ToM performance ($t(30) = 1.23, p = .230$) but there was a difference in the expected direction for second-order ToM ($t(30) = 3.29, p = .003$). Furthermore, while the groups performed significantly differently on the false-belief stories ($t(30) = 2.94, p = .006$) no significant differences existed between the groups for deception stories ($t(30) = 1.25, p = .221$).

IPSAQ.

A Chi square analysis revealed no significant differences between the groups for the personalising bias ($\chi^2(1, n = 32) = 1.659, p = .198, \phi = 0.23$). Notably, across the whole sample only three people showed no externalising bias (see Table 3), thus no further analyses were carried out for the externalising bias.

INSERT TABLE 3 ABOUT HERE

Discussion

This study tested the application of socio-cognitive models of paranoid delusions (Bentall & Kinderman, 1998) to grandiose delusions. As predicted, this

study found those experiencing grandiose delusions performed significantly worse on both the ToM jokes and stories task than depressed controls. Contrary to our hypothesis, no significant differences were found between groups on the first-order ToM tasks. However, ToM impairment was found on the jokes task and second-order stories tasks. The most sensitive ToM index within the stories task was the second-order false belief questions. Thus, participants with grandiose delusions struggled to make inferences about a person's false attribution of belief.

However, contrary to the findings of Jolley et al. (2006) the current study did not find any significant relationship between attributional style and grandiose ideation. Jolley et al. (2006) reported that patients with both grandiose and persecutory delusions showed an externalising attributional bias for negative events, although persecutory delusions on their own were not related to any particular attributional style. Reasons for our non-significant findings may relate to the use of a depressed control group who were receiving cognitive behavioural therapy (CBT) at the time of recruitment. A key central component of CBT for patients receiving pharmacological support involves addressing attributional style and close monitoring of times when the client may falsely attribute a negative event internally, as opposed to externally (Peterson et al., 2004).

The role of a grandiose delusion

This study provides some preliminary support towards the tentative model of Knowles et al. (2011) who propose that ToM may contribute to the maintenance of grandiose delusions, just as they do to persecutory delusions, and may also play a role in the dynamic shift between both types of delusions. A concurrent ToM difficulty could contribute to the maintenance of a grandiose delusion, if more external personal attributions for negative events resulted from an inability to adequately represent the

role of dynamic situational factors in determining the mental and emotional states and interpersonal behaviour of others (Knowles et al., 2011). Support for a link between ToM and the personalising bias is mixed (Craig et al., 2004; Langdon et al. 2006; Randall et al., 2003) and warrants further investigation.

Limitations and Future Research

As proposed by Corcoran et al. (1997), the results of a study comparing the performance of participants experiencing psychosis to that of participants with depression could provide a more compelling basis for an explanation of the humour deficit in psychosis. The recruitment of a depressed group in this study was to ensure that any differences found in attributional style cannot be explained by co-morbid depression which has been shown to be characterised by a distinct attributional style (Bentall et al., 1991). Nonetheless, future research would benefit from the inclusion of a non-clinical second control group to further investigate attributional style in adults with grandiose delusions.

Additional differences between the groups included the significantly higher number of atypical explanations made by patients in the psychosis group when attempting to explain the joke behind the ToM cartoons. Furthermore, this difference remained when controlling for thought disorder. Nonetheless, this finding provides support to the hypothesis that although patients experiencing grandiose delusions find cartoons amusing to the same extent as controls (there were no significant differences for the reported subjective humour appreciation for the jokes) it appears that they find different aspects of the jokes humorous.

Clinical Implications

A theoretical understanding of the role of ToM deficits or attributional biases in grandiose delusions could help clinicians develop appropriately targeted psychological interventions. Treatment is problematic in the presence of grandiose delusions which predict poor clinical outcome in adults with a diagnosis of schizophrenia and are negatively correlated with medication compliance transdiagnostically (Thara & Eaton, 1996; Applebaum & Gutheil, 1980). Furthermore, grandiose beliefs tend to be held with particularly strong conviction (Applebaum et al., 1999). People with grandiose delusions are reported to be challenging to engage therapeutically because of the positive mood and self-esteem associated with these delusions, which may hold low motivation for change (Garety et al., 2013; Knowles et al., 2011). Thus, theory of mind impairments may well go under-recognised but it seems that they ought to be a cognitive ability that clinicians need to assess. Individuals with ToM impairments may be less likely to understand the impact of their behaviour upon others, and may be more likely to engage in reckless or dangerous behaviours if they cannot infer the perspectives of others (Kerr et al., 2003). Such socio-cognitive difficulties might be amenable to cognitive restructuring within therapy which addresses unhelpful appraisals of events in relation to mood.

Conclusions

There is a strong need for a better theoretical understanding of the role of cognitive processes in grandiose delusions (Knowles et al., 2011). The significant findings of a ToM deficit in individuals with grandiose as well as persecutory delusions should stimulate further research into cognitive mechanisms of different types of unusual beliefs. However, results must be treated with caution due to the

small sample size of this study and need for a third non-clinical control group. The inclusion of both a non-clinical and a psychiatric control group would test underlying dimensional versus categorical models of mental health. Future research would benefit from administering a wider battery of neurocognitive tasks such as measures of working memory, attention or verbal fluency. Fuller exploration of ToM and attributional style in individuals experiencing grandiose delusions would have implications for the clinical treatment and management of this type of belief which appears to be relatively resistant to current psychological therapy.

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